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November 7, 1994

Memorandum

To: Catalogue Recipient

From: Acting Manager, National Training Center

Subject: "Watershed Training Opportunities" Catalogue

Meeting ecosystem management challenges of the Bureau of Land Management and Forest Service requires up to date skills and knowledge. Watershed and hydrologic skills are an important part of this need. Continuing education provides one means of acquiring and maintaining the level of skills needed both for local needs and career development.

The attached catalogue of "Watershed Training Opportunities" provides information to enable practicing hydrologists and their supervisors to assess needs and design individual training plans to develop these skills.

This catalogue is being issued to describe both the skills and knowledge needed and training opportunities responsive to these requirements. This information and future updates will be available on both agencies' computer systems. The notebook includes instructions on accessing the information.

We hope you find this product useful in developing and maintaining needed skills. If you have comments or suggestions on its utility or content, please contact the Stream Systems Technology center at Rocky Mountain Research Station, STREAM:S28A, or the BLM National Training Center, 9828 N. 31st Avenue, Phoenix, Arizona 85051.

Wayne Winterton

Attachment

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NOTEBOOK ORGANIZATION

INTRODUCTION
- Background
- Purpose
- Notebook Organization in Detail
  - Course Abstracts - What they are all about
  - "Knowledge and Skills" in Course Abstracts
  - "Degree of Difficulty" in Course Abstracts
- How To Use This Notebook

HYDROLOGIST "CORE" KNOWLEDGE AND SKILL REQUIREMENTS
- Table 1. Summary of K&S Requirements

COURSE MATRIX

COURSE ABSTRACTS
- Technical Development
  - Surface Water
  - Groundwater
  - Water Quality
  - Watershed Management and Analysis
  - Aquatic and Riparian Ecosystems
  - Statistics and Information Management
- Program Leadership
  - Communications
  - Program Management
  - Resource Policy, Values, and Economics
  - Law (Water, Threatened & Endangered Species, etc.)
  - Technology Transfer
  - NEPA/Planning

APPENDICES
- Employee Development Policies (USFS and BLM)
- Glossary
- Accessing Automated Training Information (USFS and BLM)
- Accessing U.S. Geological Survey Training Courses
- Miscellaneous Forms
- Program Contacts
- Index of Course Abstracts
- Development of Hydrologist "Core" Knowledge & Skills paper
- Acknowledgements

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INTRODUCTION

Background

Water resource issues are an increasingly important concern for federal land managers. Hydrologists in the federal land management agencies come from a wide variety of academic backgrounds, including forestry, geology, watershed science, and engineering. The rapidly changing theory, technology, and legal aspects of watershed resource management and the diverse academic background of Hydrologists stimulate the need for training to maintain and expand the professional competency in hydrology. There is also a growing need for managers and other resource professionals (e.g., fishery biologists) to acquire skills in the hydrologic sciences.

Hydrologists need basic knowledge and skills to support integrated natural resource programs and ecosystem based management. These basic skills range from proficiency in standard field procedures for data collection to a knowledge of physical processes and analytical methods for data interpretation. In addition, resource specialists need interpersonal, communication, supervisory, and leadership skills to gain increased professional and managerial responsibilities. This notebook is designed to provide water resource professionals with a comprehensive reference on training opportunities. The courses described in this notebook address the development and maintenance of technical skills, as well as program management skills needed for professional watershed hydrologists.

Purpose

This notebook is a compilation of available training courses and provides:

- an evaluation of "core" knowledge and skills required for hydrology positions,
- a single reference document for training courses available through a wide variety of vendors, and
- a link between training, knowledge and skill requirements.

The notebook should be useful for hydrologists and their supervisors for evaluating knowledge and skill requirements specific to the hydrologist's position description, identifying pertinent training opportunities to fulfill knowledge and skill requirements, and developing individual development plans (IDPs) linked to the specific requirements of the position.

The compilation of watershed-related training courses contained in this document is comprehensive, however, it is by no means exhaustive. **The notebook abstracts will be maintained on agency computerized training databases. See the Appendix section titled "Accessing Automated Training Information."** Specifically, abstracts for additional courses will be added as information becomes available, and existing course abstracts will be modified to reflect feedback received from resource specialists attending the courses. If a

course is no longer offered, that abstract will be deleted from the database. If you want an updated matrix or index call one of the program contacts (see Appendix section titled "Program Contacts"). It is your choice to maintain this notebook as either hard copy or computer copy. **No hard copy updates will be mailed out - this is the only notebook you will get via mail.**

Notebook Organization

Following the introductory material, this notebook contains an issue paper describing typical duties and "core" knowledge and skills required for trainee, operational, and journey hydrologists. The text also contains a matrix relating course abstracts to the knowledge and skills identified in the issue paper. An index of course abstracts is included at the end of the document.

COURSE ABSTRACTS

Course abstracts in this notebook are divided into two major sections: Technical Development and Program Leadership. Within each of the major sections, abstracts are grouped by major topic area as follows:

Technical Development

- Surface Water
- Ground Water
- Water Quality
- Watershed Management and Analysis
- Aquatic and Riparian Ecosystems
- Statistics and Information Management

Program Leadership

- Communications
- Program Management
- Resource Policy, Values, and Economics
- Law (Water, Threatened and Endangered Species, etc.)
- Technology Transfer
- NEPA/Planning

Within each topic area abstracts are ordered by "Degree of Difficulty" (1 to 3) and alphabetically ordered within each "Degree of Difficulty".

Each abstract contains several items of course-related information, most of which are self-explanatory. For example, course title and number, program office (sponsoring office or vendor), and target group generally require no additional explanation. Specific course dates are not listed -- just the duration of the course. Estimates of tuition are often provided;

however, these are only estimates and are subject to change with time. If a particular class has prerequisites, these are given also. Two items of information, the knowledge and skills and the degree of difficulty associated with a course, require further explanation and are discussed in detail below. Other class-specific information should be obtained directly from the course coordinator or program office. See sections III. "Program Office" or VII "Remarks" in each abstract for vendor information.

"KNOWLEDGE AND SKILLS" IN COURSE ABSTRACTS

Following the course description in each abstract is a listing of knowledge and skills that are associated with that course. These knowledge and skills are coded to correspond to the "core" knowledge and skills identified in the issue paper in Section 2. The "core" knowledge and skills identified in the issue paper for trainee, operational, and journey hydrologists are generic and likely will need modification to be applied to a specific position. For example, data analysis and interpretation skills needed at the field level likely will be quite different for a Forest Service hydrologist working in southeast Alaska and a Bureau of Land Management hydrologist working in Nevada's gold-mining country. But the "core" skill of analyzing hydrologic data and making interpretations for application to project decisions is similar in both situations.

The knowledge and skills information contained in the course abstracts is summarized in a matrix listing of course titles that precedes the abstracts. The matrix should be useful for finding courses to fill specific training needs. Courses are alphabetically listed in the matrix by title or key word in the title. For example, "Concepts in Groundwater and Contaminant Flow" is listed in the matrix as "Groundwater & Contaminant Flow." This allowed keyword or topic groupings.

These training courses should enable hydrologists to achieve and maintain knowledge and skill requirements for positions in the Bureau of Land Management and the Forest Service. Given the opportunity and motivation, some individuals may achieve an expert level of knowledge and skills in some facet of the discipline. (See Appendix Glossary for definitions of working and expert levels of knowledge).

"DEGREE OF DIFFICULTY" IN COURSE ABSTRACTS

The main target audience for this notebook is Hydrologists (Physical Science series 1315) and their supervisors. However, it is also useful for associated disciplines. The "degree of difficulty" assigned to each course presumes the trainee is a hydrologist meeting the educational requirements specified for the 1315 series. (Educational requirements of the 1315 series are also discussed in the Knowledge and Skills section of this notebook.)

The notation used for designating "degree of difficulty" in the course abstracts and matrix is an attempt to assist hydrologists in determining if a course is applicable to their situation. Obviously, course difficulty will depend on an individual's experience and background. As a starting point, the following definitions were used to designate degree of difficulty in the course abstracts:

DD#1: Basic managerial or scientific principles, and case studies are included. Preliminary experience is required.

DD#2: Intermediate knowledge and experience in:
- organizational operations and management; or
- basic field and analytical methods (statistical and mathematical computations and interpretations are required).

DD#3: Advanced knowledge and experience in:
- organizational operations and management; or
- field and analytical methods (these courses may require advanced analytical skills including extensive use of calculus, statistics, iterative solutions, and other numeric methods).

All hydrologists should be able to master technical requirements for DD#3 based on a combination of entry level professional requirements and experience. Individuals may need a refresher of mathematical, statistical, and computer skills before DD#3 courses are taken. Persons who lack the educational background to qualify as a hydrologist may want to consider the degree of difficulty and knowledge and skills when selecting courses for training.

How to Use This Notebook

Information contained in the course abstracts is subject to change without notice, and trainees are encouraged to contact the course vendor for current information on a specific course. In addition, the information contained in this notebook is also available through the computerized training databases maintained by the U.S. Forest Service and the Bureau of Land Management. Instructions for accessing the automated databases are included in the appendix. These databases will be updated periodically to incorporate new training information that becomes available.

Step 1. Evaluate professional strengths and identify developmental needs to achieve requirements.

a. Identify core knowledge and skill requirements of **present** position as classified in this notebook (K&S section) and unique requirements for position by:

i. Subject area (e.g., surface water, NEPA, etc.),
ii. Knowledge and skills category.

b. Identify knowledge and skill requirements of **future** positions by:

i. Subject area (e.g., surface water, NEPA, etc.),
ii. Knowledge and skills category.

Step 2. Identify training and development opportunities to fulfill current and probable future knowledge and skill requirements:

a. Identify available training that may meet developmental needs by subject and position level (i.e, trainee, operational, or journey) -- see course matrix.
b. Review description of specific courses.
c. Screen available courses for degree of difficulty and prerequisites to assure a correct match with the trainee's situation.

Step 3. Identify a course or sequence of courses to meet the training needs for the current position and probable future positions.

Step 4. Use the Individual Development Plan procedures of the agency to achieve priority training and development needs.

HYDROLOGIST: "CORE" KNOWLEDGE and SKILLS

GRADES 5 through 12

Forest Service and Bureau of Land Management

1994

This paper:

1. Identifies *core* service-wide knowledge and skills required by "watershed hydrologists" in grades 5 through 12.

2. Provides a foundation for training and development to maintain and expand the knowledge and skills of watershed hydrologists.

Development of this paper is described in the appendix.

Premises

Each hydrology job has unique technical requirements, but every hydrologist should master core knowledge and skills. Staffing needs of land management agencies, such as the USDA-Forest Service (FS) and the USDI-Bureau of Land Management (BLM), are for general **watershed hydrologists** with knowledge and skills that are more extensive than specialties such as statistical hydrology or hydraulic engineering. The disciplin of watershed hydrology is recognized by the American Institue of Hydrology, which certifies and publishes a registry of professional hydrologists and professional hydrogeologist, and the American Water Resources Association.

A watershed hydrologist is a physical scientist who can integrate a wide array of land management actions and watershed factors into analyses of past, present, and future water resource conditions. Data integration may occur on scales varying from small ecological units such as riffles to complex hill slopes and landscapes. Watershed hydrologists need knowledge and skills to support integrated natural resource management programs and projects.

Professional positions may be characterized as **trainee, operational, journeyman and expert** levels. These levels correspond approximately to grades 5-7, 9, 11-12, and 12 and above respectively. A GS-12 may be journeyman *or* expert depending on job factors including knowledge required, complexity, scope, effects and span of leadership.

Hydrologist: Knowledge and Skills, GS-1315-5 through 12

FS and BLM hydrologist trainees generally achieve operational skills for site-specific projects within 1-2 years after being hired at the entry level (GS-5 or 7). Routine technical supervision decreases and the complexity and scope of analyses increase over the next several years as individuals progress from the operational to the journeyman level. Journeymen generally have program responsibilities. Additional experience and education enables many hydrologists to become experts. These professional leaders may have very broad knowledge and responsibility (multiple basins and a variety of geoclimatic regimes) or they may be specialists within a sub-discipline of hydrology.

Hydrology job activities include:

1. Survey, Inventory, and Monitor Watersheds and Aquatic Ecosystems;
2. Hydrologic and Environmental Analysis;
3. Watershed and Aquatic Ecosystem Restoration;
4. Training and Technology Transfer for Water Resources Management;
5. Water Law Administration and Compliance; and
6. Program Management.

Watersheds, streams, lakes, wetlands, riparian ecosystems, and ground water are within the scope of work of FS and BLM hydrologists. Emphasis is on the relationship of water to soil, plants, and aquatic life. The distribution of water in natural ecosystems, the function of the hydrologic cycle, and how land use affects water flow and quality are processes routinely examined by hydrologists.

A hydrologist's work experience may be limited to one physiographic or climatic province, but knowledge and skills should include aquatic ecosystems in diverse environments. Breadth of experience in different physiographic and hydrologic regions, or natural resources programs may be required for some positions.

Requirements vary from one job to another, but knowledge of all (and focused experience in some) of the following watershed management activities is needed: Vegetation management, road construction, grazing, recreation uses, minerals development, fish and wildlife habitat management, hazardous materials remediation, land exchanges, riparian area and watershed restoration and improvement, and natural resources planning.

Written and oral communication skills are critical for success. Hydrologists must effectively communicate complicated technical concepts and analyses to general managers and the public. Communication skill requirements increase with the complexity of information at each professional level and corresponds to the diversity of people and groups that information is shared with. *Hydrologists also need interpersonal, supervisory, and leadership skills to meet the challenge of increasing professional and managerial responsibilities.* Since these skill needs are not unique to hydrologists they are not discussed further in this report.

Educational Requirements

The Federal Office of Personnel Management (OPM) requires hydrologists to have a degree in "physical or natural science, or engineering that included 30 semester hours in any combination of courses in hydrology, the physical sciences, geophysics, chemistry, engineering science, soils, mathematics, aquatic biology, atmospheric science, meteorology, geology, oceanography or the management or conservation of water resources" (OPM TS-1 1993). OPM requires 6 semester hours each of calculus and physics.

Minimum qualifying criteria for hydrologists that the "Association of University Watershed Scientists" (AUWS 1977) identified are:

1. 6 semester hours in differential and integral calculus, *and* 6 semester each of physics *and* chemistry; *and*

2. 3 semester hours in either hydrology, hydrologic engineering, watershed hydrology, principles of hydrology, Introduction to hydrology, water resources engineering, forest hydrology, or range hydrology; *and*

3. 27 semester hours with a minimum of 9 hours from each of three of the following four subject areas:

   (1) Conservation, administration, land use planning and management of water resources;

   (2) Atmospheric, meteorologic, geologic, geophysical, earth, soil, aquatic sciences, and water quality;

   (3) Hydrology and hydraulics; and

   (4) Statistics, computer science, logic, advanced mathematics and measurements.

The American Institute of Hydrology (AIH), which is the only organization in the United States to certify professional hydrologists and professional hydrogeologists, requires (AIH 1983):

1. 5 semester hours each of chemistry, physics *and* calculus; *and*

2. 10 semester hours in hydrology or hydrogeology; *and*

3. 9 semester hours in which hydrology and hydrogeolology constitute more than 10% of the course work (for example, geomorphology, physics of soil water, and water quality analysis); *and*

4. 6 semester hours of supplemental courses (for example, aquatic ecology, bioclimatology, and ground water law).

AUWS and AIH criteria exceed requirements of OPM and meet education expectations of the FS and BLM. OPM requirements have not been sufficient. Graduate study is frequently necessary to meet FS and BLM expectations to qualify as a hydrologist, but an advanced degree does not assure that all criteria are met.

GS-5 Hydrologist Trainee

A GS-5 trainee is typically supervised by a journeyman hydrologist.

Knowledge requirements are met through studies to obtain a bachelor of science or graduate degree that emphasizes physical science and the relation of water to the landscape. Incumbents must understand the structure, function, and processes of watersheds and aquatic ecosystems. A basic knowledge of climatology, geology, geomorphology, soils, and plant ecology is required.

GS-5 hydrologists may perform routine non-complex work under the supervision of a senior hydrologist or a qualified technician. They may be assigned work that provides experience in a variety of agency activities.

GS-7 Hydrologist Trainee

A GS-7 trainee is typically supervised by a journeyman hydrologist.

Knowledge and Skills: Knowledge and skills of the GS-5 level, plus:

1. Ability to make standard measurements and interpretations of watershed, hydrologic, and climatic conditions (attributes of basins, streams, lakes, wetlands, and ground water) in the field and from maps and aerial photos.

2. Ability to use computers to enter, edit, reduce, and retrieve hydrologic, climatic, and water quality data.

3. Ability to solve routine and non-complex water resource problems by applying basic hydrologic processes, principles, and methods, including standard relationships among precipitation, runoff, erosion, streamflow, sediment, ground water, basin and channel morphology, aquatic ecology, and water quality.

4. Ability to prescribe standard soil and water conservation principles and practices to routine and non-complex conditions of climate, topography, soils, and land use.

5. Ability to relate applicable environmental laws, regulations and policies to water resources and watershed management.

Hydrologist: Knowledge and Skills, GS-1315-5 through 12

Typical Duties of a GS-7 Hydrologist

Survey, Inventory, and Monitor:

* Makes standard measurements of watershed, hydrologic, and climatic conditions.

* Uses and maintains instruments such as water level recorders, climatic instruments, water quality sensors, and data loggers.
* Monitors implementation and effectiveness of soil and water conservation practices.

* Enters, edits, and retrieves data and performs calculations according to established protocols and routine methods.

* Identifies and obtains existing data that meet objectives of inventory, monitoring, and survey.

Hydrologic and Environmental Analysis:

* Performs routine hydrologic analyses using empirical relationships and standard techniques.

* Measures morphologic features of drainage basins and aquatic ecosystems and interprets information from aerial photos and topographic maps.

* Prescribes standard soil and water conservation practices for routine conditions.

* Assists in quantifying instream flow needs using standard protocols.

Watershed and Aquatic Ecosystem Restoration:

* Works on a crew implementing projects. Serves as crew leader involved in design of projects with limited scope and complexity.

Training and Technology Transfer:

* Assists in providing watershed management training.

* Provides general environmental education to the public.

Water Law Administration and Compliance

* Computes water use and availability using established procedures.

* Completes permit applications.

* Assists in preparing water rights claims for adjudication.

Program Management:

* Compiles data required for Federal, State, and local reports.

GS-9 Hydrologist

A GS-9 has demonstrated proficiency in basic hydrology skills and has **operational** responsibility for site-specific projects. Work is supervised by a journeyman hydrologist or a person in a related profession.

Knowledge and Skills: Knowledge and skills of the GS-7 level, plus:

1. Ability to independently conduct routine field measurements.

2. Ability to use standard statistical methods and computer applications.

3. Ability to evaluate watershed, hydrologic, and water quality conditions and predict project effects on water resources.

4. Ability to adjust soil and water conservation practices to local conditions of climate, topography, soils, and land use.

5. Ability to apply environmental laws, regulations, and policies for water resources and watershed management to project decisions.

Typical Duties of a GS-9 Hydrologist:

Survey, Inventory, and Monitor:

* Performs specialized field techniques according to established protocols.

* Inventories and classifies aquatic ecological units according to established procedures.

* Independently plans and conducts standard measurements of watershed, hydrologic, and climatic conditions.

* Independently uses computers to enter, edit, reduce, and retrieve hydrologic, climatic, and water quality data using established protocols and routine methods.

* Evaluates sufficiency of existing data, in consultation with supervisor or others, to meet objectives of projects.

* Writes reports that satisfy standards for technical accuracy and evidence.

Hydrologic and Environmental Analysis:

* Applies empirical relations to solve water resource problems using routine statistical and mathematical concepts.

* Completes project level environmental analyses of non-complex watershed and aquatic ecosystem impacts using routine professional principles, and methods. Accurately documents results in written reports.

* Prescribes soil and water conservation practices that require site specific adjustment and modification to projects of limited scope and complexity.

* Quantifies instream flow needs using standard protocols.

* Serves on interdisciplinary teams as a physical science specialist.

Watershed and Aquatic Ecosystem Restoration:

* Independently inventories restoration needs.

* Independently designs and adjusts standard watershed improvement prescriptions to fit site-specific conditions.

* Supervises implementation of watershed improvement prescriptions.

Training and Technology Transfer:

* Trains other resource professionals and technicians on soil and water conservation practices.

Water Law Administration and Compliance

* Prepares permit applications required by Federal, State and local water law(s).

* Maintains water uses inventory and files of permit applications.

* Prepares water rights claims for adjudication.

Program Management:

* Administers established watershed program of work, budget, and reporting at "local" field office.

* Analyzes data for input to required Federal, State, and local reports.

GS-11 Hydrologist

A GS-11 **journeyman** has mastered hydrologist skills, and technical supervision is limited to periodic reviews. Their ability to analyze, plan, and monitor management actions has progressed to the watershed and landscape level. Responsibility has progressed from project to the watershed program.

Knowledge and Skills: Knowledge and skills of GS-9 level, plus:

1. Ability to plan and conduct hydrologic and water quality surveys for difficult but well-precedented projects.

2. Ability to apply standard computer applications and statistical methods to interpret considerable hydrologic, climatic, and water quality data.

3. Ability to synthesize information on watershed, hydrologic, and water quality characteristics and processes, and environmental influences on water resources for a broad area.

4. Ability to apply hydrologic risk analyses to project and program plans.

5. Ability to use historic and contemporary research and monitoring results to analyze problems in the local hydrologic and physiographic region(s).

6. Ability to apply environmental laws, regulations, and policies for water resources and watershed management to plans and programs.

7. Ability to recommend program plans, budgets, and personnel needed to implement agency policies and procedures for local watershed management programs.

Typical Duties of a GS-11 Hydrologist:

Survey, Inventory, and Monitor:

* Plans and conducts water resource inventories covering multiple watersheds over a large area. Adapts methods to local conditions and analyzes results for managing watersheds and aquatic ecosystems. May supervise plans and projects of others.

* Adapts and implements aquatic ecological classification and inventory.

* Develops and conducts statistical monitoring studies of watersheds or specific sites.

Hydrologic and Environmental Analysis:

* Develops, prescribes, and evaluates soil and water conservation practices.

* Adjusts software applications.

* Provides hydrologic analysis of watershed condition and direct and cumulative effects using knowledge of hydrologic processes applied to projects and programs involving complex, multiple resource issues.

* Selects and applies standard statistical methods in design, analysis, and interpretation of data.

* Develops plans and implements protocols for quantifying instream flow.

* Leads, or member of, interdisciplinary team for environmental analyses.

* Serve as expert witness in litigation of matters related to hydrology and watershed management.

Hydrologist: Knowledge and Skills, GS-1315-5 through 12

Watershed and Aquatic Ecosystem Restoration:

* Develops and conducts watershed restoration surveys.

* Designs and implements restoration programs for entire watersheds and sets treatment priorities based on knowledge of hydrologic processes and analysis of risk.

Training and Technology Transfer:

* Provides training on hydrology and watershed management principles and practices applicable to multiple watersheds over a large area.

* Trains other professional staff and management officials on aquatic ecosystem form and function.

* May advise peers in certain areas of program.

* Applies pertinent research to plans, analysis, and monitoring; identifies research needs and coordinates with research scientist.

* Provides training on implementation and monitoring of soil and water conservation practices to comply with water quality laws and regulations.

Water Law Administration and Compliance

* Interprets and provides advice on effects of laws and policies on land and watershed management within a state or administrative unit.

* Serves as technical representative to committees establishing non-complex guidelines and regulations pursuant to water quality legislation.

* Develops and maintains water use and rights inventory for a large geographic area.

* Administers program to secure and protect water rights needed for resource protection and management.

Program Management:

* Serves as liaison with other agencies and organizations on watershed and water resources issues.

* Leader of watershed program of work, budget, and reporting for a local field office.

* Reviews plans, programs, and reports of other hydrologists for quality assurance.

* Prepares reports as required by law for Federal, State, and local agencies.

GS-12 Hydrologist

A GS-12 journeyman has developed expert knowledge, or has a span of management responsibility for related ecological programs and staff such as geology, soils, fisheries, air and riparian resources.

Knowledge and Skills: Knowledge and skills of GS-11 level, plus skill in applying knowledge to difficult and complex assignments.

Advanced level of professional competence enabling the incumbent to do *one or more of the following duties*:

* Is a recognized expert in a specialized field of hydrology.

or

* Identifies research needs and accomplishes technology transfer of research results for high priority and challenging watershed management and ecological issues.

or

* Leads related ecological programs on a National Forest or field office level and supervises other program staff.

or

* Provides hydrology planning, analysis and monitoring in a complex environment, such as multiple states, multiple physiographic provinces, ***or*** for units with critical natural resource issues that involve watershed management.

or

* Responds to significant legal inquiries and appeals related to hydrology and watershed management.

or

* Provides liaison with multiple agencies or jurisdictions on complex issues.

Table 1. Hydrologists - Summary of "Core" Knowledge and Skill Requirements: USDA-Forest Service and Bureau of Land Management (revised 2/22/94)

Trainee Hydrologist - Knowledge and skill (with guidelines and supervision) to:

- T1 Make standard measurements of watershed, hydrologic, and climatic conditions (attributes of basins, streams, lakes, wetlands, and ground water) in the field, from maps and from aerial photos.
- T2 Use computers to enter, edit, reduce, and retrieve hydrologic, climatic, and water quality data.
- T3 Solve routine and non-complex water resource problems by applying basic hydrologic processes, principles, and methods, including standard relationships among precipitation, runoff, erosion, streamflow, sediment, ground water, basin and channel morphology, aquatic ecology, and water quality.
- T4 Prescribe standard soil and water conservation principles and practices to routine and non-complex conditions of climate, topography, soils, and land use.
- T5 Relate applicable environmental laws, regulations, and policies to water resources and watershed management.

Operational Hydrologist - Demonstrated proficiency in trainee requirements and, for recurring and non-complex site-specific projects, has skill (with guidelines and limited supervision) to:

- O1 Implement plans for routine water resource investigations.
- O2 Use standard statistical methods and computer applications.
- O3 Evaluate watershed, hydrologic and water quality conditions and predict project effects to water resources.
- O4 Adjust soil and water conservation practices to local conditions of climate, topography, soils and land use.
- O5 Apply environmental laws, regulations and policies for water resources and watershed management to project decisions.

Journeyman Hydrologist - Mastered operational requirements, and for complex projects, or the multi-project and landscape level, has skill to:

- J1 Plan and conduct difficult but well-precedented water resource investigations.
- J2 Apply standard computer applications and statistical methods to interpret considerable hydrologic, climatic, and water quality data.
- J3 Synthesize information on watershed, hydrologic and water quality characteristics and processes, and environmental influences on water resources for a broad area.
- J4 Apply hydrologic risk analyses to project and program plans.
- J5 Use historic and contemporary research, and monitoring results to analyze problems in the local hydrologic and physiographic region(s).
- J6 Apply environmental laws, regulations, and policies for water resources and watershed management to plans and programs.
- J7 Recommend program plans, budgets, and personnel needed to implement agency policies and procedures for local watershed management programs.

WATERSHED TRAINING OPPORTUNITIES
COURSE K&S and DEGREE OF DIFFICULTY MATRIX

COURSES	K&S			DD		
	T	O	J	1	2	3
1900-01 NF Plan Implementation FS-****-** (TBA)		5			X	
1900-02 NF Plan Imp for Managers FS-****-** (TBA)		5			X	
Alluvial Systems FS-2520-23	3	3			X	
Applied Biodiversity Conservation FS-2600-07	5	5		X		
Applied Fluvial Geomorphology FS-2520-22	3,4	3,4			X	
Aquatic Resource Monitoring FS-2600-09		1	1		X	
AUTOCAD 12 for SMCRA FS-2520-17			2			X
Basic Hydraulic Principles FS-2530-21		3			X	
Basin Surveys & Applications FS-2600-05	2,3	1,2			X	
Biogeochemistry of Natural Waters FS-2530-28	3	2,3	3		X	
Biostatistics FS-2600-11		2			X	
Concepts in Aquatic Ecology FS-2530-23		3	3		X	
Data Import & Export FS-2500-06		2	2	X		
Effective Communications FS-2500-02		GP		X		
Erosion Prediction Technologies FS-2550-01		3	2,3		X	
Expert Witness Seminar FS-2500-03			6	X		

GP = General Professional. Covered by general competencies/K&S needed by all professionals. T=Trainee Hydrologist; O=Operational Hydrologist; J=Journey Hydrologist

WATERSHED TRAINING OPPORTUNITIES
COURSE K&S and DEGREE OF DIFFICULTY MATRIX

COURSES	K&S			DD		
	T	O	J	1	2	3
Field Water Quality Methods for Groundwater & Surfacewater FS-2530-19	1	1		X		
Fish Habitat Management FS-2630-02	3	3,5				X
GPS Technology: Mine Lands FS-2520-20			1,2		X	
Groundwater & Contaminant Flow FS-2530-04			1-4			X
Groundwater Concepts & Modeling FS-2530-24		3	2-4			X
Groundwater Field Techniques FS-2530-18	1-3	1			X	
Groundwater Hydrology BLM-7000-18			1-5			X
Groundwater Principles FS-2530-15	3	3	3		X	
Ground/Surfacewater Relation FS-2530-25		3	2-4			X
HC-Gram FS-2530-10		2	2		X	
HEC1 FS-2520-09		3	2,4			X
HEC2 FS-2530-02		3	2-4			X
HEC6 FS-2530-03		3	2,4			X
HEP (Habitat Eval Procedures) FS-2620-01		3		X		
HEP & HSI Software, Using FS-2600-12		2		X		
Hydric Soil Morphology FS-2550-02	3-5	3-5			X	
Hydrogeomorphic Approach FS-2520-10		1,4,5	1,6		X	
Hydrology for Managers FS-2520-26	5			X		

WATERSHED TRAINING OPPORTUNITIES
COURSE K&S and DEGREE OF DIFFICULTY MATRIX

COURSES	K&S			DD		
	T	O	J	1	2	3
IFIM Stream Hab Sampling Tech FS-2520-06		1	1		X	
IFIM Problem Analysis & Negot FS-2520-05		5	6,7	X		
IFIM Design & Negot Studies FS-2520-04		5	6,7	X		
Jurisdict Delineation-Waters FS-2530-06		1,4,5	1,6		X	
Leadership & Communications FS-2600-01		GP		X		
Managing Forest Ecosystems FS-2600-04		3			X	
Modeling Groundwater Flow FS-2530-05			2-4			X
Modern Anal Photogrammetry FS-2500-05	1			X		
MODFLOW Numerical Groundwater FS-2530-12		3,5	2-4			X
Nat Res Pol, Values, & Econ FS-2600-02			6,7		X	
Nonpoint Source Poll Control FS-2530-01			6,7	X		
PHABSIM #IF310 FS-2520-07		3	2,4			X
Photogram & Aerial Photo Interp FS-2500-04	1			X		
Pol & Legal Aspects of ES Mgmt FS-2670-01		5	6	X		
Probability & Stat for Data Analysis FS-2530-20		2	2-4		X	
Program Management FS-2600-03			6,7		X	
Reflex: The Analyst FS-2530-09		2		X		

WATERSHED TRAINING OPPORTUNITIES
COURSE K&S and DEGREE OF DIFFICULTY MATRIX

COURSES	K&S			DD		
	T	O	J	1	2	3
Ripar-Wetland Ecol Site Class FS-2520-01		1,2	1-3		X	
SB-Slope Stability FS-2520-19		3	2,4			X
SDPS Surface Deform Pred Syst FS-2520-21		3	2,4			X
SEDCAD+ & SEDCAD combined FS-2520-13		3,4	2,4			X
Sediment Data-Collection Techs FS-2530-26	1-3	1,2			X	
Sediment Records Computation FS-2530-27	1-3	1,2			X	
Soil, Water & Air Management FS-2500-01	4,5	3,5	6,7	X		
Statistical Analysis for SMCRA FS-2530-11		2	2			X
Stat Analysis of Hydrologic & Chemical Data FS-2520-24			2,3			X
Stat Approach to Surface Water Hydro Analysis FS-2530-22		2	2-4		X	
StratiFact FS-2520-18			2,3			X
Stream Temperature Modeling FS-2520-08		3,4	2			X
Surface Water Field & Records FS-2530-17	1,2	1,2			X	
Surface Water Flow Simulation FS-2530-08	3	3			X	
Surface Water Principles FS-2530-14	2,3	3	2,3		X	
TIPS-GSM (Introduction) FS-2520-16			2,3			X
Water Qual Mon Networks, Design FS-2530-13		1,2	1-3			X
Water Quality Principles FS-2530-16	3	3			X	

WATERSHED TRAINING OPPORTUNITIES
COURSE K&S and DEGREE OF DIFFICULTY MATRIX

COURSES	K&S			DD		
	T	O	J	1	2	3
Water Rights BLM-7000-15	1,2	5	6	X		
Watershed Rehabilitation I FS-2520-02	1-5	3,4			X	
Watershed Rehabilitation II FS-2520-03	1-5	2-4			X	
Watershed Restoration Overview FS-2520-15	3,4	3,4		X		
Watershed Restoration Techniques FS-2520-14		3,4		X		
Watershed Systems Modeling I FS-2510-01		3	2-4			X
Wetlands & Stormwater(Design/Cost/Use) FS-2520-11		4			X	
Workstation Basics (TIPS Oriented) FS-2500-07	2	2		X		

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Alluvial Systems
Course Number: FS-2520-23/G0513
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 week

III. **Program Office:**
USGS Training Office
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This course is intended to provide fundamentals and describe basic techniques available in geomorphology and sediment transport for studying the alluvial system. This course will examine upland and channel processes and their interaction. Intended as an introductory course in physical processes.

VI. **Target Group:**
Oriented towards those individuals who may be initiating studies in surface water, geomorphology, and sediment transport or who may use the physical system as a frame of reference for studies in water chemistry and biology.

VII. **Remarks:**
Course Coordinator: Randy Parker. Contact you local USGS office for further information. Apply with a cover letter and application for nomination.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** 2 **K&S** T3; 03

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Applied Fluvial Geomorphology
Course Number: FS-2520-22
Course Location: Pagosa Springs, CO
Course Tuition: $650

II. Duration of Course:
1 Week 4 Sessions

III. Program Office:
Kae & David Rosgen, Wildland Hydrology
1 Steven's Lake Road
Pagosa Springs, CO 81147 (303-731-4424)

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will:

A. Increase the level of technical understanding of the principles of geomorphology and it's application to the management of forest and range lands.

V. Brief Description of Course:

COURSE CONTENT: Geomorphology and the role of rivers (river morphology, discharge and flood frequency, meander geometry/channel dimension and channel patterns, riffle/pool relations, step/pool relations, the bankfull discharge); Extrapolation and prediction of hydrologic characteristics (hydraulic geometry relations, basin character/discharge relations, channel morphology as predictors, field methods using channel morphology characteristics); Sedimentation (role of sediment - aggradation/degradation processes, bedload/suspended load relations, sediment rating curves, stream power, shear stress and transport relations, field sampling techniques, streamflow relations to sediment size and load, analysis and prediction, recent developments updating our understanding of sediment transport relations); Stream Classification (purpose for a classification, delineative criteria, examples throughout the US, influences (subtypes), field review for delineation and measurement procedures, interpretations of stream types, applications); Stream restoration (principles of the natural stable tendencies of rivers, restoration guidelines, review of restoration projects, field design problem); Watershed management implications (cumulative effects procedures, stream threshold concepts and procedures, streamside management guidelines); Channel maintenance flow - instream flow (principles behind the procedure, discussion of recent data and experience dealing with recent water rights case.)

VI. Target Group:

Offered primarily for hydrologists, engineers and fisheries biologists who are responsible for providing technical input for planning and project design. Others who would benefit are specialists involved in water resource management and watershed management research.

VII. Remarks:

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
2 T3,4; 03,4

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Basic Hydraulic Principles
Course Number: FS-2530-21/G0043
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 Week

III. **Program Office:**
USGS Training Office
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**

This course combines lectures and class problems in the study of basic open-channel flow. Specifically, subject matter includes forces on submerged objects, similitude, velocity profiles, resistance, the momentum principle, roughness coeffiecients, energy losses, backwater computations, and flow through culverts, flow over dams, and flow through weirs. Post-course testing will be used in this course to evaluate the effectiveness of the instruction. Test scores will only be available to instructors.

VI. **Target Group:**

Personnel who have little or no background in the principles of basic hydraulics and fluid mechanics, and hydrologists who need a review of these basic concepts, may attend. All attendees must have a working knowledge of algebra and some background in basic physics.

VII. **Remarks:**

Contact your local USGS office for further information. Apply with a cover letter and application form for nomination.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 03

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Surface-Water Field and Records Techniques
Course Number: FS-2530-17/G0283
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 Week

III. **Program Office:**
USGS Training Center
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This course is designed to provide an introduction to the methods and tools required for the collection and analysis of surface-water data for standard and some not-so-standard situations. The course will provide exposure to methods that will have to be honed by experience and continued training in order for the methods to become useful tools.

VI. **Target Group:**
Water resource professionals with 3 years or less experience.

VII. **Remarks:**
Contact your local USGS office for further information. Apply with a cover letter and application for nomination.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 T1,2; O1,2

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Surface Water Flow Simulation
Course Number: FS-2530-08
Course Location: Denver, CO
Course Tuition: Cost of travel

II. **Duration of Course:**
4.5 days

III. **Program Office:**
Office of Surface Mining
Denver, Colorado

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Discuss surface water modeling theory using the SCS (Soil Conservation Service) curve number method and ths SCS revised universal soil loss equation.
B. Use STORM, SEDCAD+, RUSLE (Revised Universal Soil Loss Equation), and TR-55 (computer modeling programs).

V. **Brief Description of Course:**
Beginning course in the theory and use of surface water models STORM, SEDCAD+, TR-55, and RUSLE (Revised Universal Soil Loss Equation). Course starts with a 4 hour review of the theory of surface water modeling using the SCS curve number method and the SCS revised universal soil loss equation. One day using STORM, two days using SEDCAD+, 1/2 day using RUSLE, and 1/2 day model review. The software greatly assists quantification of SMCRA findings related to CHIA, evaluation of PHC and hydrologic reclamation plan, ponds, impoundments, banks, dams and embankments, diversions, road systems drainage, bond release, hydrologic balance protection, water quality standards and effluent limitations, sediment control measures, siltation structures, discharge structures, stream buffer zones, disposal of coal mine waste, drainage control, stabilization of surface areas, and drainage control on roads.

VI. **Target Group:**
For Hydrologists/Engineers and Soils Scientists that design or review designs of structures such as sedimentation ponds, culverts and diversion ditches and who evaluate pre and post mining soil loss.

VII. **Remarks:**
Coordinators: USDI, Office of Surface Mining Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 T3; 03

IX. **Prerequisites:**
See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Surface-Water Principles
Course Number: FS-2530-14/G0223
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 Week

III. **Program Office:**
USGS Training Center
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This course is designed to provide an introduction to basic surface-water principles. The course will provide a foundation of concepts that can be subsequently expanded by experience and continued training to satisfy the needs of intra- and/or inter-disciplinary career paths.

VI. **Target Group:**
Resource professionals with 3 years or less experience.

VII. **Remarks:**
Contact your local USGS office for further information. Submit an application and cover letter to your local USGS office for nomination.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 T2,3; 03; J2,3

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Flood Plain Hydrology: HEC-1 Microcomputer Applications
Course Number: FS-2520-09/ /93079,HE
Course Location: UC Davis/Arizona State Univ /Univ of Texas at Austin
University of Wisconsin at Madison
Course Tuition: $760-$895 depending on location

II. Duration of Course:
1 week

III. Program Office:
Univ. of CA, Davis
AZ State Univ., Tempe/Univ. of WI, Madison
Univ. of TX, Austin

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to perform:

A. Rainfall-runoff analysis
B. HEC-1 input requirements
C. Single-basin model development
D. Calibration of unit hydrograph and loss rate parameters
E. Ungauged basin analysis
F. Hydrologic techniques for routing floods
G. Kinematic wave method
H. Determination of kinematic wave parameters
I. Modeling of basins with multiple subbasins
J. Multi-lan and multi-flood analysis
K. Evaluation of detention basins and other flood control measures.

V. Brief Description of Course:

This course covers hydrologic techniques for flood plain and watershed hydrology studies. The instructors focus on analysis of ungauged basins and present material on evaluation of detention basins, channel modifications, and other flood control alternatives. The course concentrates on using HEC-1 on IBM-PC compatible microcomputers, but the material presented applies to use of the program on any computer system. Participants will be able to use the principles and techniques discussed for flood insurance studies and general flood studies.

VI. Target Group:

Experienced engineers and related professionals

VII. Remarks:

Coordinators: UC Davis - University Extension, University of CA, Davis, CA, 95616-8728; 1-800-752-0881; FAX: 916-757-8558
ASU - The Center for Professional Development, College of Engineering and Applied Sciences, Arizona State University, Tempe, AZ, 85287-7506; 602-965-1740; FAX: 602-965-8296
Univ of TX - The University of Texas at Austin, College of Engineering, Continuing Engineering Studies, ECJ 10.324, Austin, TX, 78712; 512-471-3506; FAX: 512-471-0831
Univ of WI - Department of Engineering Professional Development, 432 North Lake Street, Madison, WI, 53706; 608-262-2061; FAX: 608-263-3160

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
3 03; J2,4

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Ground-Water/Surface-Water Relationships
Course Number: FS-2530-25/G0154
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 week

III. **Program Office:**
USGS Training Office
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This course has two goals: (1) to provide practical methods of using streamflow data to obtain information on ground-water resources, and conversely, use ground-water information to better evaluate surface-water resources. The methods include statistical analysis of streamflow data, hydrograph analysis, and analytical ground-water hydrology. (2) To make participants aware of current research in the interrelationships of ground water and surface water.

VI. **Target Group:**
Experienced water resource personnel.

VII. **Remarks:**
Course Coordinator: TC Winter. Contact your local USGS office for further information. Apply with a cover letter and application for nomination.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)**
3

K&S
03; J2-4

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Sediment Transport Calculations:
HEC-6 Microcomputer Applications
Course Number: FS-2530-03
Course Location: UC Davis/Arizona State University
Course Tuition: $595 - $895 depending on location

II. Duration of Course:
3-5 days

III. Program Office:
University of California, Davis
Arizona State University, Tempe

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Review of fluvial processes
B. Physical properties of sediment and sediment transport mechanics
C. River hydraulics
D. HEC-6 data requirements
E. Interpretation of HEC-6 results
F. Development of HEC-6 sediment data
G. Selection of sediment transport equations
H. HEC-6 sorting and armoring procedures
I. Calibration and validation techniques

V. Brief Description of Course:

This course covers procedures for using HEC-6 for computation of scour and deposition by simulating the interaction between the hydraulics of the flow and sediment processes. The course includes hands-on use of the COED full-screen editor with on-screen help information; the PLOT2 program (developed for HEC-2) for plotting cross sections; and CGA, EGA, and VGA formats for screen plots.

VI. Target Group:

Designed for experienced engineers and hydrologists.

VII. Remarks:

Coordinators: UC Davis - University Extension, University of California, Davis, CA 95616-8727; 1-800-752-0881; FAX: 916-757-8558
ASU - Center for Professional Development, College of Engineeringand Applied Sciences, Arizona State University, Tempe, AZ, 85287-7506; 602-965-1740; FAX: 602-965-8296

VIII. Keywords:

Degree of Difficulty (1,2,3)	K&S
3	03; J2,4

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Water Surface Profile Computation: HEC-2 Microcomputer Applications
Course Number: FS-2530-02/93053
Course Location: UC Davis/Univ of TX at Austin
Course Tuition: $760-$895 depending on locations

II. Duration of Course:
1 week

III. Program Office:
Univ. of CA, Davis/Univ. of WI, Madison
Univ. of TX, Austin/AZ State Univ., Tempe

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Review of river hydraulics
B. Input requirements of HEC-2
C. Basic analysis of HEC-2 output
D. Water surface profiles through bridges
E. HEC-2 normal and special bridge routines
F. HEC-2 modeling techniques and error checking
G. Channel improvement option
H. Split flow calculations
I. Floodway calculations

V. Brief Description of Course:
This course covers hydraulic engineering techniques for floodplain studies using HEC-2 on IBM-PC compatible microcomputers, but the material presented applies to use of the program on any computer system. The course includes hands-on use of a menu-driven package for on-screen and plotter graphs of cross sections and water surface profiles. The COED editor, which provides information on-line, is demonstrated.

VI. Target Group:
Engineers involved with flood insurance and flood plain studies and related professionals.

VII. Remarks:
Coordinator: UC Davis - University Extension, University of California, Davis, CA, 95616-8727; 1-800-752-0881; FAX: 916-757-8558
Univ. of WI - Department of Engineering Professional Development, 432 North Lake Street, Madison, WI, 53706; 608-262-2061; FAX: 608-263-3160
ASU - Center for Professional Development, College of Engineering and Applied Sciences, Arizona State University, Tempe, AZ, 85287-7506; 602-965-1740; FAX: 602-965-8296
Univ of TX - The University of Texas at Austin, College of Engineering, Continuing Engineering Studies, ECJ 10.324, Austin, TX, 78712
Univ of TX calls their course "River & Flood Plain Hydraulics Using HEC-2"

VIII. Keywords: Degree of Difficulty (1,2,3): 3
K&S: 03; J2,4

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Ground-Water Field Techniques
Course Number: FS-2530-18/G0281
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 week

III. **Program Office:**
USGS Training Office
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This course provides a broad overview of the basic types of ground-water data and the methods used to collect and record the data. Topics covered include:

A) Water level data;
B) Borehole logs and geophysical data;
C) Well and spring discharge;
D) Aquifer testing;
E) Drilling and well construction techniques; and
F) Ground-water records and data management, including an introduction to GWSI (Ground-water site inventory) and NAWQA (National Water Quality Assessment) data requirements.

This course will be conducted at the Regional or District level under the supervision of the Regional and District ground-water specialists.

VI. **Target Group:**
Water Resource professionals with 3 years or less experience

VII. **Remarks:**
Contact your local USGS office for further information. Apply with cover letter and application for nomination.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 T1-3; 01

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Ground-Water Principles
Course Number: FS-2530-15/G0221
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 Week

III. **Program Office:**
USGS Training Center
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This course provides an introduction and overview of ground-water hydrology. The course consists of five major sections: (1) fundamental concepts and definition, (2) principles of ground-water flow and storage, (3) description and analysis of ground-water systems, (4) ground-water flow to wells, and (5) ground-water contaminations. The course is based on USGS Open-File Report 90-183, "Study Guide for a Beginning Course in Ground-Water Hydrology: Part I - Course Participants" by O.L. Franke, T.E. Reilly, R.J. Haefner, and D.L. Simmons. Additional readings also are assigned. The course will be given in USGS District offices under the supervision of the District ground-water specialist. The course was designed to be conducted as an intensive one-week workshop. However, the "study guide" concept also makes it possible to conduct the course on an individual basis in a self-paced environment.
References:
Fetter, C.W., 1988, Applied Hydrogeology: Columbus, Ohio, Merrill Publishing, p. 592.

Franke, O. Lehn, T.E. Reilly, R.J. Haefner, and D.L. Simmons, 1990, "Study Guide for a Beginning Course in Ground-Water Hydrology: Part I -- Course Participants," U.S. Geological Survey Open File Report 90-183, p.180

Freeze, R.A. and Cherry, J.A., 1979, Groundwater: Englewood Cliffs, New Jersey, Prentice-Hall Inc., p. 604.

Todd, D.K., 1980, Groundwater Hydrology: New York, John Wiley and Sons, p. 535.

VI. **Target Group:**
Resource professionals with 3 years or less experience.

VII. **Remarks:**
Contact your local USGS office for further information. Apply with cover letter and application form requesting nomination.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)**
2

K&S
T3; 03; J3

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Concepts in Groundwater and Contaminant Flow
Course Number: FS-2530-04
Course Location: Denver, CO
Course Tuition: $495

II. Duration of Course:
1 week

III. Program Office:
Co-sponsored by: University of CO, W&EST Inc and the CO Ground-Water Association

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will understand the following concepts:

A. Hydrology and hydrogeology
B. Porosity, specific yield, Darcy's Law, hydraulic conductivity, and gradient
C. Infiltration and water-table recharge
D. Aquifer characteristics
E. Equations of groundwater flow
F. Regional groundwater flow
G. Groundwater geology
H. Groundwater law
I. Well hydraulics
J. Well design
K. Groundwater contamination

V. Brief Description of Course:

The concepts, mathematics, and terminology of groundwater flow will be presented, including pumping and monitoring well design. Field measurement of the relevant hydraulic parameters will be discussed. Topics related to contaminant migration and plume development will be emphasized throughout the course. Course topics are specifically chosen for practical relevancy to groundwater oversight and compliance verification activities.

VI. Target Group:

For those who coordinate or direct groundwater professionals, or those that must deal with groundwater issues as part of their job. Refresher course for those who have not worked in the area recently.

VII. Remarks:

No prior training in hydrogeology is required. Familiarity with calculus notation is helpful, but not mandatory.

Coordinator: Dr. Roger Stillwater, Red Rocks Community College, Campus Box 31, 13300 W 6th Avenue, Lakewood CO, 80401-5398; 303-278-3892

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
3 J1,2-4

IX. Prerequisites:
None

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Ground-Water Concepts and Modeling
Course Number: FS-2530-24/G0761
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
2 weeks

III. **Program Office:**
USGS Training Office
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**

This course stresses the basic physical and mathematical concepts requisite to the effective modeling of ground-water systems. During the first week, emphasis is placed on a review of fundamentals: Darcy's Law, ground-water storage, differential equations of flow, boundary conditions, superposition, and analytical solutions. Finite-difference concepts are developed in detail by reference to electrical analogy and the governing equations. Throughout this course attendees will reinforce theoretical concepts with laboratory exercises using electrical analog models and using finite-difference simulations carried out both by hand calculations and by digital computer.

During the second week, emphasis is placed on applications to typical ground-water problems; the characteristics of various boundary conditions, coordinate systems and model types are evaluated. Actual flow systems will be discussed, and the group will "conceptualize" the systems, and evaluate the fundamental assumptions and decisions that lead to successful modeling investigations.

VI. **Target Group:**
Professional in hydrology or related disciplines.

VII. **Remarks:**
Course coordinator: Herb Buxton. Contact you local USGS office for further information. Apply with a cover letter and application for nomination.

VIII. **Keywords:**

Degree of Difficulty (1,2,3)	K&S
3	03; J2-4

IX. **Prerequisites:**
Attendees must have ground-water project experience.

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED:

I. **Course Title:** Groundwater Hydrology
Course Number: /BLM 7000-18
Course Location: Phoenix, AZ
Course Tuition: $70 (books)

II. **Duration of Course:**
2 weeks

III. **Program Office:**
Bureau of Land Management

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Demonstrate a basic understanding of groundwater principles and characteristics.
B. Be able to design water wells.
C. Understand applications of groundwater models and be able to explain model results to managers and co-workers.
D. Describe groundwater impacts from potential sources, such as, energy, minerals, and hazardous materials.
E. Demonstrate an ability to locate, interpret and manage groundwater data.

V. **Brief Description of Course:**

This course is intended for those specialists with a strong physical science background. Through exercises and lecture this course will enable the target audience to: interpret groundwater data; select locations for water wells; analayze potential impacts to groundwater quality and quantity; locate, analyze and manage groundwater data; and supply information for planning efforts.

VI. **Target Group:**

Specialists (Hydrologists, Natural Resource Specialists, Environmental Protection Specialists, Geologists, Engineers, HazMat Specialists, Soil Scientists, Physical Scientists) with STRONG PHYSICAL SCIENCE BACKGROUNDS. Other applicants will be approved on a case-by-case basis by training coordinators.

VII. **Remarks:** Introductory groundwater training will be developed for those individuals lacking a strong physical science background. This proposed course may be in the form of: self study, workshops or videos and will be designed to give a brief overview of groundwater concerns in the BLM.

Coordinator: Russ Krapf, BLM Phoenix Training Center, 5050 North 19th Avenue, Suite 300, Phoenix, AZ, 85015; 602-336-6503 or 6500 (main office); FAX: 602-336-6555

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
3 J1-5

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Ground-Water/Surface-Water Relationships
Course Number: FS-2530-25/G0154
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 week

III. **Program Office:**
USGS Training Office
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This course has two goals: (1) to provide practical methods of using streamflow data to obtain information on ground-water resources, and conversely, use ground-water information to better evaluate surface-water resources. The methods include statistical analysis of streamflow data, hydrograph analysis, and analytical ground-water hydrology. (2) To make participants aware of current research in the interrelationships of ground water and surface water.

VI. **Target Group:**
Experienced water resource personnel.

VII. **Remarks:**
Course Coordinator: TC Winter. Contact your local USGS office for further information. Apply with a cover letter and application for nomination.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
3 03; J2-4

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Modeling Groundwater Flow and Contaminant Transport on a PC
Course Number: FS-2530-05
Course Location: Denver, CO
Course Tuition: $595

II. **Duration of Course:**
1 week

III. **Program Office:**
Co-sponsored by: University of CO, W&EST, Inc., and CO Ground-Water Association

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will understand:**

A. Development of steady state flow equations for confined, leaky, and unconfined aquifers.
B. Development of unsteady flow equations
C. Model protocol
D. Mass transport of solutes; Retardation
E. Diffusion; Advection; Mechanical and hydrodynamic dispersion
F. Finite Difference Method
G. Computer lab using QuickBasic Models
H. Finite Element Method
I. MODFLOW; MOC

V. **Brief Description of Course:**

This course will introduce the modeling of groundwater flow and the transport of contaminants in groundwater. Simple finite difference and finite element codes will familiarize you with the formulation, limitations and methods of solution of these types of models. MODFLOW, a widely used standard model developed by the US Geological Survey, will be presented to solve groundwater flow problems. Similarly the MOC model, also developed by the USGS, will be offered for the solution of contaminant transport problems. Lectures on theory and applications will be coordinated with computer laboratory time, to provide hands-on experience with the software. Emphasis will be placed on building proficiency with the computer models while exploring real world applications.

VI. **Target Group:**

This course is specifically designed for professionals from government or private sector who would like to develop their groundwater computer modeling skills.

VII. **Remarks:**

Coordinator: Dr. Roger Stillwater, Red Rocks Community College, Campus Box 31, 13300 W 6th Avenue, Lakewood, CO 80401-5398; 303-278-3892

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
3 J2,3,4

IX. **Prerequisites:**

Some familiarity with groundwater terms and concepts is assumed. If you do not have a background in groundwater, you should take the shortcourse "Concepts in Groundwater Flow and Contaminant Transport."

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Numerical Ground-Water Modeling with MODFLOW
Course Number: FS-2530-12
Course Location: Denver, CO
Course Tuition: Cost of travel

II. **Duration of Course:**
5 days

III. **Program Office:**
Office of Surface Mining
Denver, Colorado

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Use MODFLOW for numerical ground-water modeling.
B. Construct model grids, simulate model boundaries, calibrate models, and use two- and three-dimensional ground-water models.

V. **Brief Description of Course:**

Cumulative hydrogeologic impact assessment of mining, as well as post-mining restoration of ground-water aquifers, are commonly investigated using numerical ground-water modeling techniques to characterize the pre- and post-mining ground-water flow system. This class introduces the concepts of numerical ground-water modeling using the USGS three-dimensional finite-difference ground-water flow model, MODFLOW. Hydrogeologists who take this class will be able to construct numerical ground-water models as well as evaluate ground-water models created by others. The class includes development of a conceptual model of a ground-water flow system and conversion of that conceptual model to the numerical computer model. Other class topics include: construction of model grids, simulation of model boundaries, sources and sinks, parameter estimation, model calibration, verification and validation, steady-state and transient simulations, and two- and three-dimensional ground-water models. The software may be used for quantifying SMCRA findings related to hydrologic balance protection, PHC, and CHIA.

VI. **Target Group:**

For hydrogeologists who are involved with the evaluation of cumulative hydrologic impact assessments and evaluating validity of Probable Hydrologic Consequences determinations.

VII. **Remarks:**

Coordinators: USDI, Office of Surface Mining Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** 3 **K&S** 03,5; J2-4

IX. **Prerequisites:**

See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** SDPS Surface Deformation Prediction System
Course Number: FS-2520-21
Course Location: Denver, CO
Course Tuition: Cost of travel

II. **Duration of Course:**
4 days

III. **Program Office:**
Office of Surface Mining
Denver, Colorado

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
SDPS is a subsidence prediction program developed for OSM by the Virginia Polytechnic Institute (VPI) to quantify anticipated subsidence from underground mining operations. This four day course taught jointly by VPI and OSM will cover in depth mechanisms and theory of subsidence, damage criteria, monitoring methods, development of prediction methods, and the use of the SDPS software for ground movement prediction. The software directly assists with findings related to 30 CFR subsidence control and hydrologic balance protection.

VI. **Target Group:**
For Engineers and/or Geologists that work with analysis of subsidence in their respective offices.

VII. **Remarks:**
Coordinator: USDI, Office of Surface Mining Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
3 03; J2,4

IX. **Prerequisites:**
See target group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: StratiFact
Course Number: FS-2520-18
Course Location: Denver, CO
Course Tuition: Cost of travel

II. Duration of Course:
2 days

III. Program Office:
Office of Surface Mining
Denver, Colorado

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

V. Brief Description of Course:

StratiFact is an automated tool for display and correlation of Borehole-log data. Data from well-logs are input to the program's data base. From there, the data can be displayed and manipulated interactively on the computer monitor. The color graphics with output to file or laser-printer allow the user to take the fully correlated data directly into the three-dimensional Dynamic Graphics software, AutoCAD, or Reflex. Day one covers input of borehole or crop data to the data base. Day two covers display and interactive manipulation of the data, as well as export to other TIPS (Technical Information Processing System) applications. The software assists in quantifying SMCRA findings related to 30 CFR backfilling, grading, geologic information, soil substitutions and toxic and acid forming materials.

VI. Target Group:

For Geoscientists that quantify overburden quality and geology for their respective offices.

VII. Remarks:

Coordinator: USDI, Office of Surface Mining Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
3 J2,3

IX. Prerequisites:
See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Field Water-Quality Methods for Groundwater and Surfacewater
Course Number: FS-2530-19/G0282
Course Location: Varies
Course Tuition: $100 per person per day

II. Duration of Course:
1 week

III. Program Office:
USGS Training Center
Denver, CO

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

V. Brief Description of Course:

The course is designed to introduce new employees to US Geological Survey methodologies for (1) sampling and field handling of ground and surface waters, bed sediments, and suspended sediment (for water-quality analyses) and (2) commonly made field water-quality measurements. Sample collection and field handling techniques for trace elements, nutrients, major ions, isotopes, and indicator bacteria will be described. The theory, methodology, and equipment used to measure water temperature, dissolved oxygen, specific conductance, pH, alkalinity, dissolved organic carbon, total coliform bacteria, fecal coliform bacteria, fecal streptococcus bacteria and Escherichia coliform bacteria will be covered. Field immuno-assay testing will be described and demonstrated. Approximately 60-80 hours of pre-course readings and exercises are required prior to attending the course. A uniform set of pre-course materials and field methodologies will be provided to each participant. These pre-course activities are mandatory.

VI. Target Group:

Water resource hydrologists and technicians with 3 years or less experience. Others with longer experience are encouraged to also complete this course per their individual training needs.

VII. Remarks:

Contact your local USGS office for further information. Apply with a cover letter and application form for nomination.

VIII. Keywords: Degree of Difficulty (1,2,3) 1 K&S T1; 01

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Biogeochemistry of Natural Waters
Course Number: PS-2530-28/G0302
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 week

III. **Program Office:**
USGS Training Office
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**

This course will explore the geochemical and biological processes influencing the chemistry of natural waters, and will focus on developing the connection between watershed and stream ecosystems. The course will begin with a review of water chemistry concepts and geochemical processes followed by terrestrial processes that impact water quality. Terrestrial-aquatic linkages will be discussed along with biogeochemical transformations in the hyporheic zone and in wetlands. In-stream processes such as organo-metal complexation, sorption/desorption, ion exchange, biological uptake and release, and carbon cycling will be addressed. Concepts and methods for assessing reactive solute transport in stream ecosystems will be presented. Water chemistry modeling techniques will be presented along with statistical, thermodynamic, and mass-balance methods for interpreting water chemistry.

VI. **Target Group:**

Personnel who are currently involved in water quality studies of a nature related to subject matter of the course, or those who expect to become involved in such a study in the near future.

VII. **Remarks:**

Course Coordinator: Larry Puckett. Contact your local USGS office for further information. Apply with a cover letter and application for nomination.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 T3; 02,3;J3

IX. **Prerequisites:**

Previous courses in biology or geochemistry are desirable but not required. However, a general knowledge of either the biological or geochemical processes to be covered is recommended. Some pre-course work will be required.

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** HC-GRAM
Course Number: FS-2530-10
Course Location: Denver, CO
Course Tuition: Cost of travel

II. **Duration of Course:**
2 days

III. **Program Office:**
Office of Surface Mining
Denver, Colorado

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Use HC-GRAM for the rapid examination of water-quality data by use of Piper (trilinear) and Stiff diagrams.
B. Review water chemistry and the importance of Quality Assurance/Quality Control.
C. Uses of Stiff and Piper diagrams.

V. **Brief Description of Course:**

HC-GRAM (Hydro Chemical Graphic Representation Analysis Methods) is a hydrology program developed in-house by OSM technical staff. The program was designed for the rapid examination of water-quality data by use of Piper (trilinear) and Stiff diagrams. It also has the ability to perform accuracy checks on the data, to produce graphics to screens or hard copy, and will accept files from Reflex. This program allows the "finger printing" of water quality data to assist in determining its source and has extensive applicability to evaluating water quality related violations and citizens complaints. The course starts with a brief review of water chemistry and of the importance of Quality Assurance/Quality Control (QA/QC). Stiff and Piper diagrams and their uses are discussed. Using case studies, the class will learn how to directly input data files and to interpret results. HC-GRAM is a useful tool when a determination of a relationship between waters must be confirmed or disproved, such as confirming the source of a water-quality violation. It can also be used to systematically compare water-quality data in relation to federal inspection and hydrologic monitoring and protection of the hydrologic balance.

VI. **Target Group:**
For Hydrologists/Geoscientists that evaluate water-quality data.

VII. **Remarks:**
Coordinators: USDI, Office of Surface Mining Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 02; J2

IX. **Prerequisites:**
See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Sediment Data-Collection Techniques
Course Number: FS-2530-26/G0912
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 week

III. **Program Office:**
USGS Cascade Volcano Lab
Vancouver, WA

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This course is intended to provide instruction in basic sediment data-collection techniques with heaviest emphasis on sediment concepts, sampler characteristics, and field techniques for sampling with suspended-sediment, bed material, and bedload samplers. "Hands-on" field experience is provided using a variety of samplers and techniques. Students also will receive an introduction to laboratory analyses of sediment samples, computation of sediment discharge records, water-quality concepts and field techniques, sedimentation surveys, and other sediment-related subjects. Pocket calculators are required for some classroom work. Notebooks and extensive handouts will be provided.

VI. Target Group:
Personnel who are actively engaged in sediment or water-quality data collection activities or who plan to become involved prior to the next presentation of the course may attend. Also, anyone who is or will be actively involved in the collection of data for a Surface Water Toxic Waste or NAWQA (National Water Quality Assessment) project should attend.

VII. **Remarks:**
Course Coordinator: Dallas Childers. Contact your local USGS office for further information. Apply with a cover letter and application for nomination.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** 2 **K&S** T1-3; 01,2

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Sediment-Records Computation
Course Number: FS-2530-27/G0962
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 week

III. **Program Office:**
USGS Training Center
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**

This is a workshop designed to provide hands-on training in the computation of sediment-discharge records. The analysis of suspended-sediment data collected on a daily, event, periodic, or intermittent basis will be emphasized. These techniques are applicable to other water-quality constituents when sufficient data are available. Participants will compute records using an interactive program (SEDCALC) being developed for Division-wide use. Computations involving other components of total sediment discharge, such as bedload discharge, bed-material discharge, and unmeasured-sediment discharge will be introduced. Participants will reduce existing data sets and will be encouraged to bring questions and example problems from home office.

VI. **Target Group:**

Personnel who are, or will be engaged in sediment record computation and data handling; Supervisors and project personnel who need more background in the analysis of sediment records.

VII. **Remarks:**

Course Coordinator: John Gray. Contact your local USGS office for further information. Apply with a cover letter and application for nomination.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 T1-3; O1,2

IX. **Prerequisites:**

G0912 Sediment data-collection techniques or equivalent experience.

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Water Quality Principles
Course Number: PS-2530-16/G0222
Course Location: Varied
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 Week

III. **Program Office:**
USGS Training Office
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This class is a general introduction to water quality intended to provide a background to all water resource professionals/scientists, to demonstrate the far-reaching aspects of water quality, and to provide background to all other water-quality classes.

VI. **Target Group:**
Water resource technical personnel

VII. **Remarks:**
Contact your local USGS office for further information. Apply with a cover letter and application requesting nomination.

VIII. **Keywords:** **Degree of Difficulty** (1,2,3) **K&S**
2 T3; 03

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Design of Water Quality Monitoring Networks
Course Number: FS-2530-13
Course Location: Colorado State University, Fort Collins, CO
Course Tuition: $950 (does not include lodging and some meals).

II. Duration of Course:
One (1) week

III. Program Office:
Colorado State University
Office of Conference Services
Fort Collins, CO 80523

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Design a water quality monitoring system.
B. Use statistics in the analysis of water quality data; understand ramifications of such analysis on monitoring design.
C. Use an application of WQSTATII.

V. Brief Description of Course:

Starts with review of basic statistics - assumed that students will have little or no background in statistics. Basic probability, frequency histograms, probability distribution functions, and the use of statistical tables will be covered. Will include both parametric and nonparametric statistics. Discuss the use of statistics in the analysis of water quality data and the ramifications of such analysis on the design of entire monitoring systems involving sampling frequency, sampling locations, measurement techniques, data reporting formats, data storage, and retrieval methods. Additional topics include the effects of correlation and seasonality and non-detects on monitoring network design and the use of an application of WQSTATII software developed at CSU. Analyzing and redesigning an existing monitoring network will be emphasized citing case studies.

VI. Target Group:

Persons actively involved, or who have an interest in the design, operation, and/or management of a water quality monitoring network for surface and subsurface monitoring.

VII. Remarks:

Bring: Calculator or Slide rule.
Course Coordinator: Office of Conference Services, Rockwell Hall, Colorado State University, Fort Collins, CO 80523; 303-491-6222.

VIII. Keywords:	Degree of Difficulty (1,2,3)	K&S
	3	01,2; J1-3

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Sediment Transport Calculations:
HEC-6 Microcomputer Applications
Course Number: FS-2530-03
Course Location: UC Davis/Arizona State University
Course Tuition: $595 - $895 depending on location

II. Duration of Course:
3-5 days

III. Program Office:
University of California, Davis
Arizona State University, Tempe

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Review of fluvial processes
B. Physical properties of sediment and sediment transport mechanics
C. River hydraulics
D. HEC-6 data requirements
E. Interpretation of HEC-6 results
F. Development of HEC-6 sediment data
G. Selection of sediment transport equations
H. HEC-6 sorting and armoring procedures
I. Calibration and validation techniques

V. **Brief Description of Course:**

This course covers procedures for using HEC-6 for computation of scour and deposition by simulating the interaction between the hydraulics of the flow and sediment processes. The course includes hands-on use of the COED full-screen editor with on-screen help information; the PLOT2 program (developed for HEC-2) for plotting cross sections; and CGA, EGA, and VGA formats for screen plots.

VI. **Target Group:**

Designed for experienced engineers and hydrologists.

VII. **Remarks:**

Coordinators: UC Davis - University Extension, University of California, Davis, CA 95616-8727; 1-800-752-0881; FAX: 916-757-8558
ASU - Center for Professional Development, College of Engineeringand Applied Sciences, Arizona State University, Tempe, AZ, 85287-7506; 602-965-1740; FAX:) 602-965-8296

VIII. Keywords: **Degree of Difficulty (1,2,3)** **K&S**
3 03; J2,4

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Stream Temperature Modeling
Course Number: FS-2520-08/FWS #IF312
Course Location: Upon request
Course Tuition: Cost reimbursable basis

II. **Duration of Course:**
1 week (40 hours)

III. **Program Office:**
US National Biological Survey
National Ecology Research Center Courses
Fort Collins, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will gain:**

A. Knowledge of stream geometry, hydrology, and meteorology related to the understanding and prediction of stream temperatures.

V. **Brief Description of Course:**

This 40 hour course concentrates on the theory and application of water temperature modeling. Over the five days, course participants will develop a knowledge of stream geometry, hydrology, and meteorology related to the understanding and prediction of stream temperatures. Topics covered include the models' assumptions and limitations, calibration and verification, trouble shooting, field data collection, parameter estimation, handling missing data, quality control, and linkages to other IFIM programs. Small group, hands-on exercises reinforce lecture concepts. Software and documentation are provided.

VI. **Target Group:**

Intended for those primarily directly involved with computer modeling of water temperatures.

VII. **Remarks:** Coordinator: USNBS, National Ecology Research Center Courses, Office of Conference Services, Colorado State University, Fort Collins, CO, 80523; 303-491-7767

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
3 03,4; J2

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Hydrology for Managers
Course Number: FS-2520-26
Course Location: Varies yearly
Course Tuition: $190

II. **Duration of Course:**
1 week

III. **Program Office:**
Kae & Dave Rosgen/Wildland Hydrology Consults
1 Steven's Lake Road
Pagosa Springs, CO 81147 (303-731-4424)

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This is a special course designed specifically for line officers with responsibility for managing watersheds within the Ecosystem Management framework. National developments in Clean Water Act Reauthorization and USDA/Forest Service leadership together have set the stage for a renewed emphasis in managing for healthy watersheds and watershed outputs.

VI. **Target Group:**
Line Officers with responsibility for managing watersheds.

VII. **Remarks:**
Course conducted on request -- Let your Regional hydrologist know you are interested in having this course taught.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
1 T5

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Modern Analytical Photogrammetry
Course Number: FS-2500-05
Course Location: Oregon State University, Corvallis OR
Course Tuition: $500

II. **Duration of Course:**
1 week

III. **Program Office:**
Forestry Conference Office, OSU
Corvallis, OR

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Use microcomputer-based programs to determine the orientation of aerial photos with respect to ground coordinates.

B. Use digital mapping, GIS data collection, and local unit planning directly from photos.

V. **Brief Description of Course:**

Microcomputer-based programs are used to determine the orientation of aerial photos with respect to ground coordinates. The use of digital mapping, GIS data collection, and local unit planning directly from photos is emphasized.

VI. **Target Group:**
Natural Resource Managers

VII. **Remarks:**

Coordinator: Forestry Conference Office, Oregon State University, Peavy Hall 202, Corvallis, Oregon 97331-5707; 503-737-2329; FAX: 503-737-2668

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
1 T1

IX. **Prerequisites:**
None

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Photogrammetry and Aerial Photo Interpretation
Course Number: FS-2500-04
Course Location: Oregon State University, Corvallis, OR
Course Tuition: $425

II. **Duration of Course:**
1 week

III. **Program Office:**
Forestry Conference Office, OSU
Corvallis, OR 97331-5707

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to apply:**

A. Fundamentals of photo interpretation
B. Fundamentals of photogrammetry
C. Advanced methods of field application.

V. **Brief Description of Course:**
The course presents the fundamentals of photo interpretation and photogrammetry, as well as the most advanced methods of field application.

VI. **Target Group:**
Practicing foresters and others who are using, or will be using, aerial photos in their work.

VII. **Remarks:**
Coordinator: Forestry Conference Office, Oregon State University, Peavy Hall 202, Corvallis, OR 97331-5707; 503-737-2329; FAX: 503-737-2668

VIII. **Keywords:**

Degree of Difficulty (1,2,3)	K&S
1	T1

IX. **Prerequisites:**
None

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Watershed Restoration Overview
Course Number: FS-2520-15
Course Location: Redwood National Park, Crescent City, CA
Course Tuition: $25

II. **Duration of Course:**
1 day

III. **Program Office:**
National Park Service
Redwood National Park, Crescent City, CA

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
Redwood National Park has the largest watershed restoration program in the NPS. Logged lands and associated roads in the Redwood Creek Basin were added to Redwood NP in 1978 to protect the resources of original park lands. New erosion control techniques were developed to help speed the natural recovery of the Redwood Creek watershed. Learn how this program is carried out, and how Redwood has become a leader worldwide in the field of restoration. This seminar will provide an introduction to watershed restoration. The morning will be spent at the park's South Operations center in Orick discussing the watershed restoration program and current methods of planning and implementing a restoration project. We will look at the erosional processes typical of the north coast. The afternoon field trip will visit completed rehabilitation projects.

VI. **Target Group:**
Professionals working in watershed rehabilitation.

VII. **Remarks:**
Coordinator: Loretta Farley, Field Seminar Coordinator, Redwood National Park, National Park Service, 1111 Second Street, Crescent City, CA 95531; 707-488-2911

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
1 T3,4;03,4

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Watershed Restoration Techniques
Course Number: FS-2520-14
Course Location: Redwood National Park, Crescent City, CA
Course Tuition: $75

II. **Duration of Course:**
3 days

III. **Program Office:**
National Park Service
Redwood National Park, Crescent City, CA

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Identify erosional problems associated with roads, determine their causes, and estimate potential and/or existing impacts.

B. Describe the various treatment options and gain a general understanding of how to design stream crossing excavations.

V. **Brief Description of Course:**

This three day course provides an introduction to watershed rehabilitation techniques concentrating on erosion control, road removal, and watershed restoration. It is suitable for professionals working in watershed restoration and other land management capacities. Knowledge of basic geomorphic principles is desirable. Mornings will be spent discussing the Redwood Creek Basin (an intensively logged area prior to NPS ownership) watershed rehabilitation program, its evolution over the past 13 years, and current methods of planning and implementing a rehabilitation project. We will look at the erosional processes typical of the north coast and the effects of road building and instructions for inventorying and prioritizing problem areas, making decisions on the wide range of treatment options, and designing stable excavations. Methods of planning and maintaining permanent roads with minimal impact, as well as removing roads that are no longer needed, will be discussed. Afternoon field trips will visit completed projects and areas where work is actively being planned and implemented.

VI. **Target Group:**
Geomorphologists, Hydrologists, professionals working in watershed rehab

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VII. **Remarks:**

Coordinator: Loretta Farley, Field Seminar Coordinator, National Park Service, Redwood National Park, 1111 Second Street, Crescent City, CA 95531; 707-488-2911

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
1 03,4

IX. **Prerequisites:**
Basic understanding of geomorphic principles

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED:4/94

I. **Course Title:** Basin Surveys and Applications
Course Number: FS-2600-05
Course Location: Utah State University
Course Tuition: $300 (does NOT include lodging and meals)

II. **Duration of Course:**
Four (4) days

III. **Program Office:**
Continuing Education Program
Wildlife, Fisheries, and Rare Plants Staff
Logan, Utah 84322-5210

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Describe and use comprehensive watershed inventory techniques as a basis for fisheries programs.
B. List and describe inventory techniques and the field work demonstrating these approaches.
C. Use a computer storage system that will have ways of manipulating data to meet needs.
D. Translate applications of techniques into project planning, area planning, and monitoring the results.

V. **Brief Description of Course:**
This course is designed to give the participants a working knowledge of watershed inventory techniques to be used as a basis for fisheries programs.

VI. **Target Group:**
Fisheries biologists, Hydrologists, and others involved in watershed monitoring.

VII. **Remarks:**
The professor in charge is Glenn Chen, Department of Fisheries and Wildlife, Utah State University, Logan, Utah 84322-5210 at (801) 797-1090.
G.Chen:S22L06A
Course Coordinator: Shelly Witt, 801-752-1311, or S.WITT:S22L06A.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** 2 **K&S** T2,3; 01,2

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Managing Forest Ecosystems/Managing Forest Landscapes for Ecosystem Values
Course Number: FS-2600-04
Course Locations: Clemson University
Oregon State University
Course Tuition: $2000 (includes lodging and meals)

II. Duration of Course:
Two (2) weeks

III. Program Office:
Continuing Education Program
Wildlife, Fisheries, and Rare Plants Staff
Logan, Utah 84322-5210

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Describe and use opportunities and techniques for managing forest structure and composition to achieve compatible objectives for wildlife, fisheries, timber production and other uses.

V. Brief Description of Course:
The course provides hands-on training in the use of opportunities and techniques used for managing forest structure and composition.

VI. Target Group:
Silviculturists, biologists, and related natural resource professionals.

VII. Remarks:
The professors in charge are Dr. John Tappeiner and Dr. William McComb, College of Forestry, Oregon State University, Corvallis, Oregon 97331 at (503) 737-4215 or 737-2244 and Dr. Jacqueline Haymond, Forest Resources Department, Clemson University, Clemson, South Carolina 29634-1003 at (803) 656-4831. Course Coordinator: Shelly Witt, 801-752-1311, or S.WITT:S22L06A.

VIII. Keywords:

Degree of Difficulty (1,2,3)	K&S
2	03

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Surface Water Flow Simulation
Course Number: FS-2530-08
Course Location: Denver, CO
Course Tuition: Cost of travel

II. Duration of Course:
4.5 days

III. Program Office:
Office of Surface Mining
Denver, Colorado

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Discuss surface water modeling theory using the SCS (Soil Conservation Service) curve number method and ths SCS revised universal soil loss equation.
B. Use STORM, SEDCAD+, RUSLE (Revised Universal Soil Loss Equation), and TR-55 (computer modeling programs).

V. Brief Description of Course:
Beginning course in the theory and use of surface water models STORM, SEDCAD+, TR-55, and RUSLE (Revised Universal Soil Loss Equation). Course starts with a 4 hour review of the theory of surface water modeling using the SCS curve number method and the SCS revised universal soil loss equation. One day using STORM, two days using SEDCAD+, 1/2 day using RUSLE, and 1/2 day model review. The software greatly assists quantification of SMCRA findings related to CHIA, evaluation of PHC and hydrologic reclamation plan, ponds, impoundments, banks, dams and embankments, diversions, road systems drainage, bond release, hydrologic balance protection, water quality standards and effluent limitations, sediment control measures, siltation structures, discharge structures, stream buffer zones, disposal of coal mine waste, drainage control, stabilization of surface areas, and drainage control on roads.

VI. Target Group:
For Hydrologists/Engineers and Soils Scientists that design or review designs of structures such as sedimentation ponds, culverts and diversion ditches and who evaluate pre and post mining soil loss.

VII. Remarks:
Coordinators: USDI, Office of Surface Mining Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. Keywords: Degree of Difficulty (1,2,3) 2 K&S T3; 03

IX. Prerequisites:
See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Watershed Rehabilitation I
Course Number: FS-2520-02/BLM PV 7000-8
Course Location:
Course Tuition:

II. **Duration of Course:**
5 days

III. **Program Office:**
Russ Krapf, Bureau of Land Management
PTC, 5050 N 19th Avenue, Suite 300
Phoenix, AZ 85015

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Understand and apply the basic philosophies, principles, and techniques of upland watershed protection and rehabilitation.
B. Conduct a watershed evaluation.
C. Prepare a watershed rehabilitation plan.

V. **Brief Description of Course:**

This course is designed to give participants some practical approaches and techniques for dealing with watershed and stream channel impacts from land disturbances. The emphasis of Watershed Rehabilitation I is on the philosophy, principles, and techniques of upland watershed protection and rehabilitation. Trainees are taught how to conduct a watershed evaluation in the field, prepare a rehabilitation plan, design rehabilitation treatments, and implement watershed improvement projects. Watershed rehabilitation histories are discussed. Hands-on field data collection followed by computer sessions will allow participants to directly experience key elements of project design and modeling.

VI. **Target Group:**

This course is targeted for professionals in land and resource management agencies. Hydrologists, Soil Scientists, Range Conservationists, Wildlife and Fish Biologists, Foresters, Engineers, Recreation Planners, Surface Protection Specialists, and Geologists. This course is being offered to both BLM and FS employees.

VII. **Remarks:**

Coordinator: Russ Krapf, BLM, PTC, 5050 N 19th Avenue, Suite 300, Phoenix, AZ 85015; 602-336-6503 (or 6500 main office); FAX: 602-336-6555

Nonrefundable tuition is required. Consult the current course schedule for tuition rates and specific dates.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** 2 **K&S** T1-5; 03,4

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISE: 4/94

I. **Course Title:** Watershed Rehabilitation II
Course Number: FS-2520-03/BLM PV 7000-11
Course Location:
Course Tuition:

II. **Duration of Course:**
5 days

III. **Program Office:**
Russ Krapf, Bureau of Land Management
PTC, 5050 N 19th Avenue, Suite 300
Phoenix, AZ 85015

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Understand stream channel and wetland processes and behavior.
B. Apply principles and techniques of stream channel rehabilitation.
C. Prepare a plan for rehabilitation stream channels or wetlands.

V. **Brief Description of Course:**

This course is designed to give participants some practical approaches and techniques for dealing with watershed and stream channel impacts from land disturbances. The emphasis of Watershed Rehabilitation II is on the philosophy, principles, and techniques of rehabilitation for stream channels, riparian zones, and wetlands. Trainees are taught how to interpret stream channel and wetland processes and behavior, prepare a rehabilitation plan, design rehabilitation treatments, and implement stream channel improvement projects. Watershed rehabilitation case histories are discussed. Hands-on field data collection followed by computer sessions will allow participants to directly experience key elements of project design and modeling.

VI. **Target Group:**

This course is targeted for professionals in land and resource management agencies. Hydrologists, Soil Scientists, Range Conservationists, Wildlife and Fisheries biologists, Foresters, Engineers, Recreation Planners, Surface Protection Specialists, and Geologists. This course is being offered to both BLM and FS employees.

VII. **Remarks:**

Coordinator: Russ Krapf, BLM, PTC, 5050 N 19th Avenue, Suite 300, Phoenix, AZ, 85015; 602-336-6503 (or 6500 main office); FAX: 602-336-6555

Non-refundable tuition is required

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 T1-5; 02-4

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Flood Plain Hydrology: HEC-1 Microcomputer Applications
Course Number: FS-2520-09/ /93079,HE
Course Location: UC Davis/Arizona State Univ /Univ of Texas at Austin
University of Wisconsin at Madison
Course Tuition: $760-$895 depending on location

II. Duration of Course:
1 week

III. Program Office:
Univ. of CA, Davis
AZ State Univ., Tempe/Univ. of WI, Madison
Univ. of TX, Austin

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to perform:

A. Rainfall-runoff analysis
B. HEC-1 input requirements
C. Single-basin model development
D. Calibration of unit hydrograph and loss rate parameters
E. Ungauged basin analysis
F. Hydrologic techniques for routing floods
G. Kinematic wave method
H. Determination of kinematic wave parameters
I. Modeling of basins with multiple subbasins
J. Multi-lan and multi-flood analysis
K. Evaluation of detention basins and other flood control measures.

V. Brief Description of Course:

This course covers hydrologic techniques for flood plain and watershed hydrology studies. The instructors focus on analysis of ungauged basins and present material on evaluation of detention basins, channel modifications, and other flood control alternatives. The course concentrates on using HEC-1 on IBM-PC compatible microcomputers, but the material presented applies to use of the program on any computer system. Participants will be able to use the principles and techniques discussed for flood insurance studies and general flood studies.

VI. Target Group:

Experienced engineers and related professionals

VII. Remarks:

Coordinators: UC Davis - University Extension, University of CA, Davis, CA, 95616-8728; 1-800-752-0881; FAX: 916-757-8558
ASU - The Center for Professional Development, College of Engineering and Applied Sciences, Arizona State University, Tempe, AZ, 85287-7506; 602-965-1740; FAX: 602-965-8296
Univ of TX - The University of Texas at Austin, College of Engineering, Continuing Engineering Studies, ECJ 10.324, Austin, TX, 78712; 512-471-3506; FAX: 512-471-0831
Univ of WI - Department of Engineering Professional Development, 432 North Lake Street, Madison, WI, 53706; 608-262-2061; FAX: 608-263-3160

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
3 03; J2,4

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Introduction to TIPS Geologic Surface Modeling (GSM)
Course Number: FS-2520-16
Course Location: Denver, CO
Course Tuition: Cost of travel

II. Duration of Course:
4.5 days

III. Program Office:
Office of Surface Mining
Denver, CO

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will gain:

A. Familiarity with Technical Information Processing System (TIPS).

V. Brief Description of Course:

The course involves an intense 4.5 days of hands-on training in the basics of spatial analysis related to geologic modeling and volumetric calculations, generation of cross sections, fence diagrams, pre- and post-mining topographic maps, three dimensional perspective views, and tables of volume of various overburden materials. The course also covers how data from other TIPS programs can be imported into the GSM and results exported to other programs such as Arc/Info and AutoCAD. The software greatly assists quantifying SMCRA findings related to backfilling and grading, geologic information, soil substitution, toxic and acid forming materials, cumulative hydrologic impact assessment, evaluation of PHC, BOD release, disposal of excess spoil, and disposal of coal-mine waste.

VI. Target Group:

Geoscientists and engineers that model overburden, pit design, topography, and geology for their respective offices associated with AML reclamation design and evaluation AOC. Also for professionals who analyze spatial information related to ground water quality, overburden toxicity, etc.

VII. Remarks:

Coordinator: USDI, Office of Surface Mining, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 8020-5733; 303-672-5500

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
3 J2,3

IX. Prerequisites:
See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** SB-Slope: Slope Stability Analysis
Course Number: FS-2520-19
Course Location: Denver, CO
Course Tuition: Cost of travel

II. **Duration of Course:**
2 days

III. **Program Office:**
Office of Surface Mining
Denver, Colorado

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
SB-Slope is a slope-stability modeling tool. The software calculates the safety factor for critical slopes that the user inputs in cross-section form. Both Simplified Bishop or Spencer calculation methods may be used. Output files, printer or color plotter. Color interactive screen-graphics and easy-to-read plots add to the features of this software. Day one covers the engineering principles behind the programs analytical methods and includes a visit to a soils engineering laboratory. Day two completes training on the in-depth use of the software itself. The software directly assists with findings related to 30 CFR backfilling and grading stability, disposal of excess spoil stability requirements, impoundment stability, and road cut stability.

VI. **Target Group:**
For engineers and/or geologists that work with analysis of slope stability in their respective offices.

VII. **Remarks:**
Coordinators: USDI, Office of Surface Mining Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
3 03; J2,4

IX. **Prerequisites:**
See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** SEDCAD+ and SEDACAD combined shortcourse
Course Number: FS-2520-13
Course Location: Denver, CO
Course Tuition: $645

II. **Duration of Course:**
3 days

III. **Program Office:**
Civil Software Design, Ames, IA
Dr. Richard Warner, University of Kentucky

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Hydrology: Multiple design storm types, Hydrograph generation, Hydrograph routing, Baseflow components, and Multiple subwatersheds.
B. Retention and sediment basin design: Automatic stage-discharge for principal & emergency spillways, Multiple types of principle spillways, Stage-area-capacity, Sediment storage requirements, Hydrograph and sedimentgraph routing, and determination of sediment trap efficiency, outflow hydrograph & sedimentgraph, peak stage, peak discharge, retention time, effluent peak, total, settleable, and average concentrations.
C. Erosion and Sediment: Advanced erosion generation routines for steep slopes, generation of sedimentgraphs, routing of sedimentgraphs, baseflow components, and evaluate effectiveness of erosion controls.
D. Diversions: Non-erodible, earthen, grass waterways, rock riprap, and shapes.
E. Culvert Sizing: Provides performance curves and accommodates submerged and un-submerged outlets.
F. Energy Dissipation Plunge Pools: Provides tradeoffs among cantilever pipe outlet elevation, rock riprap size, and plunge pool size.
G. Grass Filter Strips and Porous Rock Check Dams: Sediment trap efficiencies.
H. Additional Digitizer Utilities: Earthwork determinations, Areas, Lengths, and Slopes.
I. SEDACAD Module 1 operations: Plan view, drawing features, sections, cross sections, specifications, principal/emergency spillways, leaders and labels, dimensions, materials, titles, project title blocks, and other miscellaneous options.

V. **Brief Description of Course:**
The SEDCAD+ model integrates the engineering design of traditional and innovative stormwater, erosion, and sediment control design techniques into a comprehensive system, and assists you in rapidly evaluating the effectiveness of alternative control options through applications of Computer Aided Engineering. SEDACAD Module 1 provides the ability to produce design drawings: plan views, sections, cross sections, and specifications from SEDCAD+ inputs without learning the big AutoCAD graphics engine.

VI. **Target Group:** Hydrologists and engineers

VII. **Remarks:** Coordinators: Pamela J Schwab, Director, Civil Software Design, PO Box 706, Ames, IA 50010; 515-292-4115 or Dr. Richard Warner 606-257-3000 ext. 217

VIII. **Keywords:** Degree of Difficulty (1,2,3) 3 **K&S** 03,4; J2,4

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Watershed Systems Modeling I
Course Number: FS-2510-01/G0083
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 week

III. **Program Office:**
USGS Training Office
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This course is designed to help hydrologists analyze and predict the hydrologic impacts of land-use change. Basic hydrologic processes such as precipitation, snow accumulaltion and melt, infiltration, evapotranspiration, runoff components and overland channel flow will be presented in the context of three watershed models: DR3M, PRMS, and HSPF. Model calibration, verification, sensitivity analysis, and optimization will be presented, and attendees will gain hands-on experience with each model. Instruction on data management for watershed models will be provided. Lectures are scheduled in the morning and late afternoon. Mid-day sessions will be used to run the models solving class problems. This course will be a prerequisite for Watershed Systems Modeling II (G0183) which will emphasize model calibration using data provided and developed by trainees.

VI. **Target Group:**
Attendees should have an interest in projects assessing the hydrologic impacts of urban development and other changes in land use, drainage systems and climate. Understanding of basic hydrologic processes will be helpful.

VII. **Remarks:**
Course Coordinator: Alan Lumb. Contact your local USGS office for further information. Apply with a cover letter and application for nomination.

VIII. **Keywords:**

Degree of Difficulty (1,2,3)	K&S
3	03; J2-4

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED:4/94

I. Course Title: Applied Biodiversity Conservation
Course Number: FS-2600-07/BLM 1730-4
Course Locations: Varies Yearly
Course Tuition: $1100

II. Duration of Course:
One (1) week

III. Program Office:
Bureau of Land Management
Pheonix Training Center
WO-220/TC220

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Describe biodiversity in understandable terms to internal and external publics.
B. Identify appropriate "tools" to use in biodiversity conservation efforts.
C. Identify the types, scale, and format of resource information needed to address management decisions regarding biodiversity.
D. Demonstrate state-of-the-art reserve and corridor design techniques.
E. Describe how to incorporate biodiversity conservation efforts into land use planning efforts.

V. Brief Description of Course:
This course is designed to increase participants understanding and appreciation for applying biodiversity conservation.

VI. Target Group:
Target audience is wildlife, fisheries, botanist, range, soil/water/air, forester, and natural resource specialist staff positions.

VII. Remarks:
The Professor in charge is Charles Pregler, BLM Phoenix Training Center, 5050 N. 19th Avenue, Phoenix, Arizona 85015 at (602) 640-2651.
Course Coordinator: Shelly Witt, 801-752-1311, or S.WITT:S22L06A.

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
1 T5; 05

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Designing and Negotiating Studies Using IFIM
Course Number: FS-2520-04/FWS #IF200
Course Location: Fort Collins, CO
Course Tuition: $500

II. **Duration of Course:**
1 week (38 hours)

III. **Program Office:**
US National Biological Survey
National Ecology Research Center Courses
Fort Collins, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Diagnose the institutional, physical, and biological aspects of an instream flow problem.
B. Describe the basic concepts, major components, and flow of information within IFIM.
C. Identify critical elements in planning and scoping an instream flow study.
D. Evaluate the adequacy of a study plan that uses IFIM.
E. Develop alternative flow recommendations from an example IFIM data-set.

V. **Brief Description of Course:**

Provides training in the design and conceptual principles of IFIM applications. The course presents the necessary background, application logic and specific skills to decide when, where, and how to use IFIM. The student will receive training in scoping projects, designing studies, and negotiating objectives aimed toward problem solving where IFIM is used. The training necessary for achieving a proficiency in using IFIM is described.

VI. **Target Group:**

Highly recommended for persons who plan to review the plan of study and recommendations made by others.

VII. **Remarks:**

Coordinator: US NBS, National Ecology Research Center Courses, Office of Conference Services, Colorado State University, Fort Collins, CO, 80523; 303-491-7767

Materials provided include a guide to stream habitat analysis and software for problem identification.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
1 05; J6,7

IX. **Prerequisites:**
None

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Problem Analysis and Negotiating Solutions Using the IFIM Model Outputs
Course Number: FS-2520-05/FWS #IF201
Course Location: Fort Collins, CO
Course Tuition: $550

II. Duration of Course:
1 week (40 hours)

III. Program Office:
US National Biological Survey
National Ecology Research Center Courses
Fort Collins, CO

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Formulate, generate, and evaluate alternatives in the management of water with special emphasis on hydropeaking applications.
B. Determine the effectiveness, feasibility, risks, and cost effectiveness of proposed water management alternatives.
C. Conduct quality assurance reviews of data and simulations used in IFIM applications.
D. Prepare for and effectively participate in negotiations or other decision making processes.

V. Brief Description of Course:

Provides practical hands-on training in instream flow problem resolution through integrative negotiation techniques and real-time analysis of alternatives. The course concentrates on the primary uses of IFIM in project impact analysis and negotiation of operating rules for water management projects. The curriculum emphasizes analysis of hydropeaking projects, but the concepts nd skills are equally applicable to other types of water management problems. Concepts are introduced by lecture and re-inforced by structured problems and follow-up discussion (labs); the ratio of lecture to lab time is approximately 25:75. Subjects include: problem identification and impact analysis, formulation and evaluation of alternatives, feasibility and risk analysis, and incremental problem resolution through integrative negotiation and real-time formulation of alternatives.

VI. Target Group:

Project leaders and others responsible for recommendations, negotiating solutions to problems, or preparing alternatives for solutions to problems, or preparing alternatives for recommendations or negotiations.

VII. Remarks:

Coordinator: US NBS, National Ecology Research Center Courses, Office of Conference Services, Colorado State University, Fort Collins, CO, 80523; 303-491-7767

Time series library software and documentation are provided

VIII. Keywords: Degree of Difficulty (1,2,3) 1 K&S 05; J6,7

IX. Prerequisites:
IF200

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Using HEP and HSI Software
Course Number: FS-2600-12/FWS #HEP300
Course Location: Fort Collins, CO
Course Tuition: $300

II. **Duration of Course:**
2 days (16 hours)

III. **Program Office:**
US National Biological Survey
National Ecology Research Center Courses
Fort Collins, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Compute Habitat Units (HU) for HEP study
B. Analyze field data and select project alternatives
C. Determine HU gains and losses for projects
D. Calculate compensation requirements
E. Review HSI models
F. Modify HSI models
G. Construct HSI models
H. Calculate HSI values from field data

V. **Brief Description of Course:**
This 16 hour course provides "hands-on" training in the use of HEP and HSI software. Participants will also practice data entry, field modification, and file management and analysis using microcomputers.

VI. **Target Group:**
Personnel responsible for: (1) designing and processing field data from a HEP study; (2) building or modifying HSI models; and (3) analyzing, interpreting, using, or defending the results of a HEP study. Course does not require a computer background or a knowledge of programming. Software and user's manuals are provided.

VII. **Remarks:**
Coordinator: US National Biological Survey, National Ecology Research Center Courses, Office of Conference Services, Colorado State University, Fort Collins, CO, 80523; 303-491-7767

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
1 02

IX. **Prerequisites:**
NR561 or permission of instructor

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Aquatic Resource Monitoring for Natural Resource Specialists
Course Number: FS-2600-09
Course Location: Utah State University, Logan, UT
Course Tuition: $550 (does not include lodging and meals)

II. Duration of Course:
1 week (fall)

III. Program Office:
BLM/USFS Aquatic Monitoring Center
Utah State University

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Introduce the essential elements needed in a successful monitoring program and to provide background information on the legal mandates for agency monitoring.
B. Establish a basic understanding of the biological, physical, and statistical principles necessary for designing effective aquatic monitoring strategies.
C. Introduce field equipment and techniques commonly used in aquatic resource monitoring.
D. Display a variety of technological developments and state-of-the-art methodologies used for analysis of monitoring data.
E. Provide guidance in interpretation and reporting of monitoring data, and present examples where such information has served to influence the decision making process.

V. Brief Description of Course:

Speakers will introduce the conceptual framework and thought processes needed to design an aquatic monitoring program. The legal mandates which have required land management agencies to monitor the effects of their activities will be discussed, with an emphasis on recent events (Clean Water Act, Pacific NW Salmon Recovery Strategy, etc...) that have increased both agency and public awareness of importance of protecting aquatic resources. Essential information presented on the ecology of aquatic biota (macroinvertebrates, warm and cold water fishes, algae/macrophytes,) the dynamics of aquatic ecosystems, and basic principles of hydrology, fluvial geomorphology,and limnology. Spend a day in the field developing familiarity with various types of field equipment and sampling techniques. Demonstrations of how monitoring data is used. Technology for analyzing and interpreting biological/physical data will be presented. Case studies. Attendees use information presented to develop an aquatic monitoring program for use at their field unit.

VI. Target Group:

Natural Resource Specialists with aquatic monitoring responsibilities.

VII. Remarks:

Cost of training does not include meals or lodging. Course Coordinators: Mark Vinson (801-797-2038), Fred Mangum (801-378-4928), Glenn Chen (801-797-1090) This will be an annual course,and attendance will be limited to 20 persons. Additional courses will be scheduled on demand.

VIII. Keywords: Degree of Difficulty (1,2,3) 2 K&S 01; J1

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED:4/94

I. Course Title: Basin Surveys and Applications
Course Number: FS-2600-05
Course Location: Utah State University
Course Tuition: $300 (does NOT include lodging and meals)

II. Duration of Course:
Four (4) days

III. Program Office:
Continuing Education Program
Wildlife, Fisheries, and Rare Plants Staff
Logan, Utah 84322-5210

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Describe and use comprehensive watershed inventory techniques as a basis for fisheries programs.
B. List and describe inventory techniques and the field work demonstrating these approaches.
C. Use a computer storage system that will have ways of manipulating data to meet needs.
D. Translate applications of techniques into project planning, area planning, and monitoring the results.

V. Brief Description of Course:
This course is designed to give the participants a working knowledge of watershed inventory techniques to be used as a basis for fisheries programs.

VI. Target Group:
Fisheries biologists, Hydrologists, and others involved in watershed monitoring.

VII. Remarks:
The professor in charge is Glenn Chen, Department of Fisheries and Wildlife, Utah State University, Logan, Utah 84322-5210 at (801) 797-1090.
G.Chen:S22L06A
Course Coordinator: Shelly Witt, 801-752-1311, or S.WITT:S22L06A.

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
2 T2,3; O1,2

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Concepts in Aquatic Ecology
Course Number: FS-2530-23/G0402
Course Location: Varies
Course Tuition: $100 per person per day

II. Duration of Course:
1 week

III. Program Office:
USGS Training Center
Denver, CO

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

V. Brief Description of Course:

The objective of this course is to provide an overview of ecological concepts that can be applied in water-quality assessments. The course will emphasize concepts and general approaches. Field applications will be introduced but not discussed in detail. Topics will include biological approaches to water-quality assessment, current concepts in stream ecology, ecology of aquatic organisms, and important environmental factors influencing stream ecosystems. A portion of the course will emphasize contaminant dynamics in aquatic ecosystems to include toxicological implications and bioaccumulation processes. Techniques for analysis and interpretation of biological data will be introduced.

VI. Target Group:

Intended primarily for NAWQA (National Water Quality Assessment) personnel directly involved in studies that incorporate ecological investigations for water-quality assessment. Attendees are expected to have a fundamental understanding of aquatic biology.

VII. Remarks:

Coordinator: Terry M. Short. Contact your local USGS office for further information. Apply with a cover letter and application for nomination. Attendance will be limited to 24.

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
2 03; J3

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Design, Construction, and Use of Wetlands for Stormwater Management
Course Number: FS-2520-11
Course Location: Portland, OR/Washington, DC/Charleston, SC
Course Tuition: $800

II. Duration of Course:
1 week

III. Program Office:
National Wetland Science Training Cooperative
L.C. Lee & Associates, Inc.

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to identify:

A. How wetlands affect water quality, sediment control, flood control, and life support functions within a watershed context.
B. Hydrologic principles associated with stormwater, wetlands, and the watershed.
C. Basic concepts, objectives, and methods of stormwater management.
D. Federal and state regulations associated with wetlands and stormwater management systems
E. Wetland design, construction, and planting techniques for stormwater management systems.
F. Impacts of stormwater management on wetlands.
G. Bioengineering techniques for wetlands used in stormwater systems.

V. Brief Description of Course:
This course provides participants with a comprehensive overview of the design, construction and use of wetlands in stormwater systems.

VI. Target Group:
This training is designed for wetland scientists, engineers, landscape architects, urban planners, and other professionals involved with the design or planning of stormwater management systems that include wetlands.

VII. Remarks:
Coordinator: National Wetland Science Training Cooperative, L.C. Lee & Associates, Inc., 221 1st Avenue West, Suite 415, Seattle, WA 98119; 206-283-0673; FAX: 206-283-0627

VIII. Keywords: Degree of Difficulty (1,2,3) 2 K&S 04

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: IFIM Stream Habitat Sampling Techniques
Course Number: FS-2520-06/FWS #IF305
Course Location: Mountain Campus, CSU, Pingree Park, CO
Course Tuition: $500

II. Duration of Course:
5 days (36 hours)

III. Program Office:
US National Biological Survey
National Ecology Research Center Courses
Fort Collins, CO

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Design a stream sampling strategy based upon study objectives.
B. Apply stream segmentation criteria for identifying macrohabitat segments.
C. Identify and quantify mesohabitat types within a segment.
D. Quantify the depth, velocity, substrate, and cover in mesohabitat types.
E. Construct an aggregate mesohabitat model to represent a macrohabitat segment.
F. Conduct field data collection in an effective and efficient sequence.
G. Identify and collect field data required by hydraulic simulation programs
H. Record, organize, and check field data for completeness.
I. Properly use and conduct routine maintenance on required surveying and hydrologic sampling equipment.

V. Brief Description of Course:
This is a 36 hour field application course on the use of stream habitat sampling techniques and equipment required for IFIM studies.

VI. Target Group:
The course is for individuals responsible for designing and conducting, or reviewing stream habitat studies. Note that the foundational principles, concepts and analytical techniques used with IFIM are covered in IF200 and IF201, and are not reviewed in this course.

VII. Remarks:
Coordinator: USNBS, National Ecology Research Center Courses, Office of Conference Services, Colorado State University, Fort Collins, CO, 80523; 303-491-7767

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
2 01; J1

IX. Prerequisites:
IF200

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Jurisdictional Delineation of Waters of the United States Including Wetlands
Course Number: FS-2530-06
Course Location: Varied
Course Tuition: $800

II. **Duration of Course:**
1 week

III. **Program Office:**
National Wetlands Science Training Cooperative

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Recognize and describe hydrologic indicators of wetland conditions.
B. Identify and characterize wetland soils and wetland pedogenic processes.
C. Plant identification and characterization of hydrophytic plant communities.
D. Synthesis of hydrologic, soils, and plant community information for jurisdictional delineation of relatively pristine, as well as highly disturbed wetlands.
E. Field and administrative techniques for documentation of wetland jurisdictional delineations and non-compliance with Federal, State and local wetlands protection statutes.
F. Procedures to be used by wetland scientists and permit specialists who need to present and defend scientific data in administrative hearings or in court.
G. As possible, any certification criteria proposed for "Corps Wetland Delineation Certification."

V. **Brief Description of Course:**

Training provided for Local, State, and Federal Wetland Regulatory programs in the identification and delineation of waters of the United States including wetlands. Participants will be provided with a comprehensive, lecture and field-based introduction to the "1987 US Army Corps of Engineers Wetlands Delineation Manual", as well as applicable Corps and EPA guidance and clarification on the use of the Manual. Regional and State wetland programs will be introduced and discussed. The inter-relationships among Local, State and Federal programs will be identified and clarified. Emphasis will be placed on addressing any new proposed criteria to be used in "Corps of Engineers Wetland Delineator Certification" program.

VI. **Target Group:**

Participants are welcome from the private sector, private non-profit organizations, academe, and Federal, State, County, or Municipal agencies.

VII. **Remarks:**

Coordinator: National Wetlands Science Training Cooperative, L.C. Lee & Associates, Inc., 221 1st Avenue West, Suite 415, Seattle, WA, 98119; 206-283-0673; FAX: 206-283-0627

VIII. **Keywords:** Degree of Difficulty (1,2,3) 2 | K&S 01,4,5; J1,6

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Riparian-Wetland Ecological Site Classification
Course Number: FS-2520-01/BLM 1737-4
Course Location:
Course Tuition:

II. Duration of Course:
1 week

III. Program Office:
Russ Krapf, BLM, PTC,
5050 N 19th Avenue, Suite 300
Phoenix, AZ 85015

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Participate on an interdisciplinary team to map and describe riparian-wetland sites for use in the planning process and resource evaluation.

V. Brief Description of Course:

Participants will learn the roles and responsibilities of the interdisciplinary team in mapping and describing riparian-wetland ecological sites for resource analyses and interpretations. The course will include a combination of classroom and field instruction.

VI. Target Group:

Must be teams made up of a soil scientist, vegetation specialist, hydrologist and biologist from a District or Forest. Managers are encouraged to attend as part of their local team. Up to four teams of each of the four specialists plus one manager per team from each state will be allowed. Teams may have representatives from other agencies, i.e., the soil scientist may be from SCS, etc. This course is held by individual states, upon request to the Training Center.

VII. Remarks:

Coordinator: Russ Krapf, BLM, PTC, 5050 N 19th Avenue, Suite 300, Phoenix, AZ 85015; 602-336-6503 or 6500 (main office); FAX: 602-336-6555

VIII. Keywords:

Degree of Difficulty (1,2,3)	K&S
2	01,2; J1,2,3

IX. Prerequisites:

BLM courses: SS4000-2 - An Introduction to Ecological Sites
SS1737-1 - Coordinated Riparian Area Management
SS1737-2 - Riparian Management and Channel Evolution

Pre-reading assignment to be mailed upon selection as a participant: Tech Note 1737-7 - Procedures for Ecological Site Inventory - With Special Reference to Riparian-Wetland Sites.

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** The Hydrogeomorphic Approach to Functional Assessment of Wetlands
Course Number: FS-2520-10
Course Location: Ft. Collins, CO/Seattle, WA
Course Tuition: $800

II. **Duration of Course:**
1 week

III. **Program Office:**
National Wetlands Science Training Cooperative

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to identify:**

A. Existing conditions and functions in reference to "project" wetlands.
B. Assessment of impacts associated with projects proposed for wetlands at site-specific and landscape scales.
C. Success associated with wetland mitigation efforts that include construction, restoration, and enhancement.

V. **Brief Description of Course:**

The course provides lecture, laboratory, and field-based introductions to current approaches for the assessment of functions and impacts in wetlands under Federal and/or state jurisdiction. Functional assessment training begins with brief overviews of the history of assessment methodologies. Specifically, the training will introduce the use and technical limitations of the National Wetland Evaluation Technique (WET2.1) as a basis to progress beyond WET and introduce participants to state-of-the-art approaches for developing functional assessments based upon the hydrogeomorphic approach currently being developed by the US Army Corps of Engineers and several co-operating agencies.

VI. **Target Group:**
Interested professionals

VII. **Remarks:**

Coordinators: National Wetland Science Training Cooperative, L.C. Lee & Associates, Inc., 221 1st Avenue West, Suite 415, Seattle, WA 98119; 206-283-0673; FAX: 206-283-0627

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** 2 **K&S** 01,4,5; J1,6

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED:4/94

I. **Course Title:** Fish Habitat Management
Course Number: FS-2630-02
Course Locations: Virginia Polytechnic Institute & State University, Blacksburg, Virginia
Utah State Univeristy, Logan, Utah
Course Tuition: $2000 (includes lodging and meals)

II. **Duration of Course:**
Two (2) weeks

III. **Program Office:**
Continuing Education Program
Wildlife, Fisheries, and Rare Plants Staff
Logan, Utah 84322-5210

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. List and evaluate physical factors (including geomorphology and hydrology) affecting aquatic environments.
B. Practice and complete a habitat analysis.
C. Plan and evaluate habitat enhancement projects.
D. Practice monitoring the effects of forest management on aquatic resources.

V. **Brief Description of Course:**
This course is designed to increase the knowledge and skills of employees to evaluate physical factors (including geomorphology and hydrology) affecting aquatic environments.

VI. **Target Group:**
Fisheries biologists, hydrologists and other interested resource professionals.

VII. **Remarks:**
Professors in charge are Dr. Gerald H. Cross from the Department of Fisheries and Wildlife Science, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0321 and Dr. Jeffery Kershner, USDA FOREST SERVICE, Fish Habitat Ecology Unit, Wildlife & Fisheries Department, Utah State University, Logan, UT 84322-5210. 801-797-2500
Course Coordinator: Shelly Witt, 801-752-1311, or S.WITT:S22L06A.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
3 T3; 03,5

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Using the computer based Physical Habitat Simulation System (PHABSIM)
Course Number: FS-2520-07/FWS #IF310
Course Location: Fort Collins, CO/Logan, UT
Course Tuition: $600

II. **Duration of Course:**
5 days (40 hours)

III. **Program Office:**
US National Biological Survey
National Ecology Research Center Coures
Fort Collins, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Understand the concepts of stream hydraulics and steam habitat analysis.
B. Describe PHABSIM's calculations, components, and flow of information.
C. Simulate the effects of changes in flow on depth and velocity.
D. Estimate riverine habitat quality and quantity as a function of flow.
E. Process data and understand field measurements required for PHABSIM.
F. Analyze, interpret, critique, and defend stream habitat analysis results.

V. **Brief Description of Course:**

Physical Habitat Simulation System (PHABSIM) simulates hydraulic relationships of numerous stream flows with water depths and velocities in a rigid channel. Then it quantifies the biological relationship of changes in physical habitat (depth, velocity, substrate, and cover) with habitat suitability for target fish or invertebrate life stages, or suitability for water-related recreation. PHABSIM is useful when relatively steady flow is the major determinant controlling the riverine resources. This course presents the necessary background, application logic, and menu of computer programs to understand why and how to use PHABSIM.

VI. **Target Group:**

The course is intended for those responsible for: (1) quantification of instream flow requirements, basin-wide water rights; (2) planning of water delivery schedules, minimum releases, and yearly water budgets; and (3) impact assessment of stream flow depletion, augmentation, or channel alteration. Prior IBM-PC experience with editors and spreadsheets is recommended but not required.

VII. **Remarks:**

Coordinator: USNBS, National Ecology Research Center Courses, Office of Conference Services, Colorado State University, Fort Collins, CO, 80523; 303-491-7767

Software, documentation, lecture notes, and detailed examples will be provided.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
3 03; J2,4

IX. **Prerequisites:**
Prior IBM-PC experience with editors and spreadsheets is recommended but not required. Introductory knowledge of IFIM from IF200 is required.

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Data Import and Export (for TIPS - Technical Information Processing System)
Course Number: FS-2500-06
Course Location: Denver, CO
Course Tuition: Cost of travel

II. **Duration of Course:**
2 days

III. **Program Office:**
Office of Surface Mining
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
Almost everyone associated with mine planning, environmental assessment, and permit review uses a computer to increase efficiency. Much of the data contained in permit application packages is stored on magnetic media. The ability to import data from coal operators' computer systems to TIPS (Technical Information Processing System) saves huge amounts of time in the permit review process. This course discusses typical file formats used by OSM, USGS, EPA, and industry, and how this information can be directly imported to and exported from TIPS.

VI. **Target Group:**
Professionals who work with mine planning, environmental assessment, and permit review.

VII. **Remarks:**
Coordinators: USDI, Office of Surface Mining Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
1 02; J2

IX. **Prerequisites:**
General knowledge of micro or mini computers and TIPS software

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WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Workstation Basics (TIPS oriented)
Course Number: FS-2500-07
Course Location: Denver, CO
Course Tuition: Cost of travel

II. **Duration of Course:**
2 days

III. **Program Office:**
Office of Surface Mining
Denver, Colorado

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
Workstation Basics will provide the student with a general background in the basic operation of the "Next Generation" TIPS (Technical Information Pressessing System) Unix-based engineering workstations. Topics covered include: Unix fundamentals, electronic mail usage (local, TIPS network-wide, and Internet-wide), networking fundamentals including file transfers, access to data kept at the central site in Denver, and basic system maintenance and administration. After completing this course the student should have basic working skills to adequately use the TIPS Unix-based engineering workstations for daily work.

VI. **Target Group:**
Professionals who use TIPS Unix-based engineering workstations.

VII. **Remarks:**
Coordinators: USDI, Office of Surface Mining, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
1 T2; 02

IX. **Prerequisites:**
General knowledge of micro or mini computers.

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Reflex: the Analyst
Course Number: FS-2530-09
Course Location: Denver, CO
Course Tuition: Cost of travel

II. Duration of Course:
2 days

III. Program Office:
Office of Surface Mining
Denver, Colorado

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Use graphic intensive database management system, Reflex.
B. Develop data input screens, data reports to files or hard copy, cross tabulations to hard copy, and graphics.

V. Brief Description of Course:

Reflex is a graphic intensive, user friendly flat-file database management system (DBMS) and powerful data analysis tool. The software allows the user to develop data input screens, data reports to files or hard copy, cross tabulations to hard copy, and graphics to screens or hard copy. The course is designed to show how to use Reflex as a central repository for data that will be used by a multitude of other TIPS (Technical Information Processing System) software packages. This will include writing reports that other software can read and use. Reflex is particularly useful for storing and analyzing water quality and quantity data related to CHIA, and verifying PHC determination. Also, it is extremely useful for storing and analyzing data associated with revegetation success, overburden quality, and evaluation of topsoil substitutes. The software has such a wide applicability that it may be used for quantifying SMCRA findings related to 30 CFR Parts 780, 784, 800, 816, and 817 or balancing the federal budget.

VI. Target Group:

Open to all persons with data base needs.

VII. Remarks:

Coordinator: USDI, Office of Surface Mining Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. Keywords:	Degree of Difficulty (1,2,3)	K&S
	1	02

IX. Prerequisites:

See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Biostatistics
Course Number: FS-2600-11/FWS 5106
Course Location: New Orleans, LA
Course Tuition: $425

II. Duration of Course:
One (1) week

III. Program Office:
National Biological Survey
Office of Training and Education
4401 N. Fairfax Dr - RM 741
Arlington, VA 22203

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A) Use basic statistical terminology and concepts.
B) Use statistical measures of central tendency.
C) Apply common frequency distributions (e.g., normal, Chi-square, Poisson, t-distributions, etc.).
D) Identify when to use inferential statistical methods, such as t-tests, z-tests, analysis of variance, analysis of covariance, regression, contingency tests, goodness fo fit tests, etc.
E) Use data transformations properly.
F) Know when to use a variety of distribution-free, nonparametric statistical tests (e.g., Mann-Whitney U, Kruskal-Wallace, Spearman Rank Correlations, etc.).
G) Discuss microcomputer software packages available for statistical analysis.

V. Brief Description of Course:
This course is designed as a refresher course for individuals with some familiarity with statistics. The emphasis will be on hypothesis testing techniques, measures of central tendency, and sampling techniques. A cookbook-type approach will be used to lead the participants through a variety of different situations where statistics are required to verify experimental results.

VI. Target Group:

VII. Remarks:
Superintendent, Fisheries Academy - USNBS, Rt. 3, Box 49, Kearneysville, WV, 25430; 304-725-8461 ext 312 (commercial) or 700-925-5312 (FTS)

VIII. Keywords: Degree of Difficulty (1,2,3) 2 K&S 02

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Global Positioning System (GPS) Technology - Applications to Inspection and Enforcement and Abandoned Mine Lands
Course Number: FS-2520-20
Course Location: Denver, CO
Course Tuition: Cost of travel

II. **Duration of Course:**
2 days

III. **Program Office:**
Office of Surface Mining
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Gain knowledge of GPS capabilities and a measure of confidence in operating mapping-level GPS equipment.

V. **Brief Description of Course:**

Global Positioning System (GPS) technology allows rapid, accurate surface positioning of mine features. Use of GPS equipment has direct applicability to SMCRA requirements pursuant to 30 CFR cross sections and plans, stream buffer zones, to allow checks on the ground compliance with approved mining plans. NAVSTAR satellite signals are accessable using portable, highly mobile equipment that receive, process and store positional data. GPS post-processing and file manipulation will be demonstrated. Day one covers basic GPS concepts, pre-mission planning, introduction to GPS equipment, and field "hands-on" data collection and navigating. Day two covers GPS data reduction and results evaluation and a field exercise.

VI. **Target Group:**

Participants should be technical specialists in the field of the physical or natural sciences, who routinely inspect or evaluate field sites for active mining compliance or AML reclamation or inventory.

VII. **Remarks:**

Coordinators: USDI, Office of Surface Mining, Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 J1,2

IX. **Prerequisites:**
See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Probability and Statistics for Data Analysis
Course Number: FS-2530-20/G0754
Course Location: Varies
Course Tuition: $100 per person per day

II. **Duration of Course:**
1 Week

III. **Program Office:**
USGS Training Office
Denver, CO

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
This course will introduce data analysis techniques appropriate for interpreting surface-water, ground-water, and water-quality data. The assumptions behind each statistical technique and the appropriate situations for their application will be stressed. PLEASE NOTE that the correspondence course requires an average of 120 hours to complete and will begin early in the calendar year and end in late spring. Mathematics will be limited to algebra. This course or its equivalent is a prerequisite to Statistical Approach to Surface Water Hydrologic Analysis (G0113)

VI. **Target Group:**
Water resource personnel responsible for analyzing hydrologic data or reviewing interpretive reports may attend.

VII. **Remarks:**
Contact your local USGS office for futher information. Apply with a cover letter and application for nomination. Class limited to 26 people.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 02; J2-4

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Statistical Approach to Surface-Water Hydrologic Analysis
Course Number: FS-2530-22/G0113
Course Location: Varies
Course Tuition: $100 per person per day

II. Duration of Course:
1 week

III. Program Office:
USGS Training Office
Denver, CO

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

V. Brief Description of Course:

This course includes explanation, discussion, and solution of hydrologic problems related to the statistical analysis of surface-water data. Practice will be gained in solving hydrologic problems through manual computations as well as utilizing selected computer programs. Principle subjects covered are: (1) statistical concepts, definitions, and accuracy of stream flow characteriestics; (2) capabilities of statistical programs in WATSTORE/NWIS and training in the use of ANNIE, a computer program for interactive hydrologic analyses and data management; (3) frequency analysis of surface water data at gaging stations including discussion of mixed populations, trends, and serially correlated data; (4) record extension techniques; (5) estimation of low-flow statistics at partial-record stations; (6) regionalization of stream flow characteristics using multiple regression techniques (ordinary and generalized least squares); and (7) network analysis using generalized least squares regression.

VI. Target Group:

Attendees must: (1) be actively engaged or anticipate involvement in surface-water hydrologic projects; (2) have previous instruction in statistics (college level course, etc); and (3) be interested in mathematics with a desire to better understand statistical techniques used to analyze and interpret surface-water data.

VII. Remarks:

Contact you local USGS office for further information. Apply with cover letter and application form for nomination.

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
2 02; J2-4

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: AUTOCAD 12 for SMCRA Related Applications
Course Number: FS-2520-17
Course Location: Denver, CO
Course Tuition: Cost of travel

II. **Duration of Course:**
4 days

III. **Program Office:**
Office of Surface Mining
Denver, Colorado

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

V. **Brief Description of Course:**
AUTOCAD 12 is a general purpose Computer Aided Design/Drafting application for Mining, Geology and Environmental mapping. The topics to be included are basic drawing techniques to 3D drawing concepts, such as the use of coordinate systems, named construction planes, icons, point filters, and related topics. The viewing capabilities such as viewport, parallel or perspective projection and shading allow the user to model overburden and pit design. Special interest areas in mining and geology will tie all of AUTOCAD12's features to cartography, digital terrain modeling, open pit estimating, 3D geology, using existing data and interfacing with other TIPS (Technical Information Processing System) software such as the TIPS geologic Surface Model and Arc/Info GIS. The software can be used to assist in quantifying SMCRA findings related to 30 CFR (Backfilling, grading and geologic information).

VI. **Target Group:**
For Geoscientists and Engineers that model overburden, pit design, topography and geology for their respective offices associated with AML reclamation design and evaluating AOC.

VII. **Remarks:**
Coordinators: USDI, Office of Surface Mining Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
3 J2

IX. **Prerequisites:**
See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Introduction to TIPS Geologic Surface Modeling (GSM)
Course Number: FS-2520-16
Course Location: Denver, CO
Course Tuition: Cost of travel

II. Duration of Course:
4.5 days

III. Program Office:
Office of Surface Mining
Denver, CO

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will gain:
A. Familiarity with Technical Information Processing System (TIPS).

V. Brief Description of Course:
The course involves an intense 4.5 days of hands-on training in the basics of spatial analysis related to geologic modeling and volumetric calculations, generation of cross sections, fence diagrams, pre- and post-mining topographic maps, three dimensional perspective views, and tables of volume of various overburden materials. The course also covers how data from other TIPS programs can be imported into the GSM and results exported to other programs such as Arc/Info and AutoCAD. The software greatly assists quantifying SMCRA findings related to backfilling and grading, geologic information, soil substitution, toxic and acid forming materials, cumulative hydrologic impact assessment, evaluation of PHC, BOD release, disposal of excess spoil, and disposal of coal-mine waste.

VI. Target Group:
Geoscientists and engineers that model overburden, pit design, topography, and geology for their respective offices associated with AML reclamation design and evaluation AOC. Also for professionals who analyze spatial information related to ground water quality, overburden toxicity, etc.

VII. Remarks:
Coordinator: USDI, Office of Surface Mining, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 8020-5733; 303-672-5500

VIII. Keywords:	Degree of Difficulty (1,2,3)	K&S
	3	J2,3

IX. Prerequisites:
See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Statistical Analysis of Hydrologic and Chemical Data
Course Number: FS-2520-24/G0724
Course Location: Varies
Course Tuition: $100 per person per day

II. Duration of Course:
1 week

III. Program Office:
USGS Training Office
Denver, CO

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

V. Brief Description of Course:

This course is composed of explanation, discussion, solution, and selected hydrologic problems related to surface water, water quality, and ground water. Experience in solving hydrologic problem will be acquired through manual computations as well as the use of computer programs. This course will introduce advanced statistical techniques for hydrologic analysis and is an extension of PROBABILITY AND STATISTICS FOR DATA ANALYSIS (G0754). Principal topics covered are: (1) Frequency analysis of hydrologic data including discussions of commonly used frequency distributions; (2) Time series analysis; (3) Kriging; and (4) Multivariate techniques including eigen techniques, principal component analysis, factor and cluster analysis.

VI. Target Group:

VII. Remarks:

Course Coordinator: WO Thomas. Contact your local USGS office for further information. Apply with a cover letter and application for nomination.

VIII. Keywords:	Degree of Difficulty (1,2,3)	K&S
	3	J2,3

IX. Prerequisites: PROBABILITY AND STATISTICS FOR DATA ANALYSIS (G0754) or equivalent statistical training through college courses or work experience is a prerequisite for this course. An evaluation of previous statistical training will be made by the course coordinator. A pre-class assignment will review certain topics such as ordinary least squares regression, matrix algebra, and eigenvalues and eigenvectors. Successful completion of this pre-class assignment and a statement describing previous training will be used to evaluate those attendees who have not taken course G0754.

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Statistical Analysis for SMCRA Related Applications
Course Number: FS-2530-11
Course Location: Denver, CO
Course Tuition: Cost of travel

II. Duration of Course:
3 days

III. Program Office:
Office of Surface Mining
Denver, Colorado

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Use StatGraphics to quantify change in water quality, revegetation statistics and the generation of statistical tables and graphics.

B. Quantify change from baseline conditions, temporal analysis of water quality data, two sample t-tests, determining frequency distributions, and quantifying revegetation success and using statistics to quantify overburden quality.

V. Brief Description of Course:

StatGraphics is a powerful, easy to use statistical analysis tool. The course emphasizes quantifying change in water quality and revegetation statistics and the generation of statistical tables and graphics so that the results of your analysis can be easily understood by decision makers. Quantifying change from baseline conditions, temporal analysis of water quality data, two sample t-tests, determining frequency distributions, quantifying revegetation success, and using statistics to quantify overburden quality are covered, along with importing data from TIPS (Technical Information Processing System) databases and exporting results to word-processing packages for final reports. The software may be used for quantifying SMCRA findings related to CHIA, evaluation of PHC and hydrologic reclamation plan, hydrologic balance protection, water quality standards and effluent limitations, soil substitution, toxic and acid forming materials, standards for revegetation success.

VI. Target Group:

Open to all persons with statistical analysis needs. Course emphasizes water quality and revegetation success statistics

VII. Remarks:

Coordinator: USDI, Office of Surface Mining Technical Information Processing System, Western Support Center, 1999 Broadway, Suite 3320, Denver, CO 80202-5733; 303-672-5500

VIII. Keywords:	Degree of Difficulty (1,2,3)	K&S
	3	02; J2

IX. Prerequisites:

See Target Group section

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Effective Communications
Course Number: FS-2500-02/FWS #5112
Course Location: Hilton Head Island, SC
Course Tuition: $425

II. Duration of Course:
1 week

III. Program Office:
Superintendent, Fisheries Academy - USNBS
Rt 3, Box 49, Kearneysville, WV, 25430

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Explain the importance of written, visual, and verbal communication in becoming a more productive and effective professional.
B. Help others be concise, direct, brief, and effective in their speaking and writing.
C. Write and present necessary communications more clearly and logically.
D. Edit their own writing to more effectively communicate.
E. Recognize and correctly use the best medium for the message in routine correspondence.
F. Use illustrations (tables, graphs, figures and charts) to clarify abstract data, simplify complex explanations and instructions, and add interest to written communications.
G. Plan, prepare, present, and evaluate their own oral and written presentations.
H. Select and use the appropriate audio-visual media for oral presentations. Communicate more effectively with various audiences through acquired presentation and listening skills.

V. Brief Description of Course:
This course is designed to help managers assess and enhance their communication skills. It addresses the speaking, listening, and writing style in addition to editing and managing the writing of others.

VI. Target Group:
Managers

VII. Remarks:
Coordinator: Superintendent, Fisheries Academy - USNBS, Rt. 3, Box 49, Kearneysville, WV, 25430; 304-725-8461 ext 312; FTS 700-925-5312

VIII. Keywords: Degree of Difficulty (1,2,3)
1

K&S
General Professional

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNTIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED:4/94

I. **Course Title:** Leadership and Communications
Course Number: FS-2600-01
Course Location: Virginia Polytechnic Institute and State University
Blacksburg, Virginia
Course Tuition: $2,300 (includes lodging and meals)

II. **Duration of Course:**
Two (2) weeks

III. **Program Office:**
Continuing Education Program
Wildlife, Fisheries, and Rare Plants Staff
Logan, Utah 84322-5210

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Describe the value systems of other professional colleagues.
B. List and describe agencies' value systems in natural resource management.
C. List and describe the trends and value systems of the general publics.
D. Practice and demonstrate essential communication skills.
E. Practice and demonstrate required negotiation techniques.
F. Prepare a plan for personal and professional growth.

V. **Brief Description of Course:**

The course sensitizes participantes to value systems of colleagues, the agency and the publics; learn essential communication skills; practice negotiation techniques; and plan for personal and professional growth.

VI. **Target Group:**
The course is designed for natural resource professionals.

VII. **Remarks:**
The professor in charge is Dr. Gerald H. Cross from the Department of Fisheries and Wildlife Science, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0321.
Course Coordinator: Shelly Witt, 801-752-1311, or S.WITT:S22L06A

VIII. **Keywords:** Leadership, Communication
Degree of Difficulty (1,2,3) 2
K&S General Professional

IX. **Prerequisites:**
None

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Nonpoint Source Pollution Control on Federal Lands
Course Number: FS-2530-01/BLM 7000-9
Course Location:
Course Tuition:

II. **Duration of Course:**
32 Hours

III. **Program Office:**
Russ Krapf, Bureau of Land Management
PTC, 5050 N 19th Avenue, Suite 300
Phoenix, AZ 85015

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. List and describe the impacts and implications that section 319 of the Clean Water Act will have on federal land management agencies.

B. Develop an outline for the creation of a MOU to formalize federal cooperation involvement in a state's water quality management plan. To list the responsibilities and authorities of a state designated water quality management agency.

C. List the component parts of the nonpoint source pollution control strategy that belong in land use plans and the requirements that should be incorporated into site specific plans. List methods other than planning to implement the nonpoint source pollution control strategy.

D. Demonstrate in a discussion of your current program the process for best management practice implementation and monitoring. Develop an action plan for reaching the desired level of best management practice implementation and monitoring.

E. Develop an action plan specific to your region/state that will create an awareness of nonpoint source pollution control and steer the agencies toward meeting our responsibilities under the Clean Water Act. This action plan should include methods such as briefings, training, interagency efforts, etc. that will be used to accomplish the goal.

V. **Brief Description of Course:**

This training will communicate the agencies' strategy for meeting the consistency requirements of the Clean Water act to the audience. The ultimate goal is to enable the agencies to integrate multiple use management of federal lands into state nonpoint source pollution control management plans and to retain the primary management authority with the federal agency.

VI. **Target Group:**

The target audience for this training are line managers, and resource staff specialists, planners, and environmental coordinators, all from the Regional and STate Office level. These individuals are directly responsible for assuring that the water quality requirements are built into agency plans and activities.

VII. **Remarks:**

Coordinator: Russ Krapf, BLM, PTC, 5050 N 19th Avenue, Suite 300, Phoenix, AZ, 85015; 602-336-6503 (or 6500 main office); FAX:602-336-6555

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **KLS**
1 J6,7

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. **Course Title:** Soil, Water and Air Management
Course Number: FS-2500-01/BLM 7000-1
Course Location: To Be Announced
Course Tuition:

II. **Duration of Course:**
Two (2) weeks

III. **Program Office:**
Bureau of Land Management
PTC, 5050 N 19th Ave., Suite 300
Phoenix, AZ 85015

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. List and explain the primary objectives, policies, and responsibilities of the SWA programs.
B. Describe and explain the purpose of Watershed Condition Analysis; apply this concept in Resource Management Planning, Activity Planning, and Monitoring.
C. Identify steps to improve/insure the effectiveness of communications between SWA specialists and line managers.
D. Demonstrate the ability to use personal computers as a tool in carrying out SWA responsibilities (e.g., hydrologic design, erosion prediction, monitoring data analysis).

V. **Brief Description of Course:**

The course will focus on the definition of SWA program objectives and ways of achieving them. Program policies and responsibilites are described. The concept of watershed condition analysis is explained and applied to resource management planning, activity planning, and monitoring. Practical exercises are provided in personal computer use. A 2-day field trip provides an on-the-ground opportunity to identify, analyze, and discuss options for addressing common watershed problems. Specific issues such as water rights, water quality, riparian area management, and climatic monitoring are discussed. Effective communication between SWA specialists and line managers is emphasized throughout the course.

VI. **Target Group:**

GS-5/7/9/11 soil scientists, soil conservationists, hydrologists, and other specialists with primary responsibilities (50% of time) in the SWA subactivity.

VII. **Remarks:**

Contact: Russ Krapf, PTC, 5050 N 19th Avenue, Suite 300,
Phoenix, AZ, 85015; 602-336-6503 or 6500 (main office)

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
1 T4,5; 03,5; J6,7

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNTIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED:4/94

I. Course Title: Program Management
Course Number: FS-2600-03
Course Location: Utah State University
Course Tuition: $300 (does NOT include lodging or meals)

II. Duration of Course:
One (1) week

III. Program Office:
Continuing Education Program
Wildlife, Fisheries, and Rare Plants Staff
Logan, Utah 84322-5210

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Describe and use Wildlife & Fisheries elements in Forest Plans to develop a Program action plan.
B. Use the program action plan to incorporate personnel development.
C. Develop appropriate strategies for program budgeting and marketing.

V. Brief Description of Course:
This course is designed to provide natural resource managers with the skills to effectively develop and implement a program of work on their home unit. Participants are given two days of lecture by experienced instructors in each topic area and have two days to work with instructors and other participants to develop a draft program document for their home unit. Presentations of the draft documents are done during the final day. Sections of the draft document are due throughout the week.

VI. Target Group:
The target audience of the course is journey-level biologists responsible for program development. Open to any natural resource professional in developing an action oriented program.

VII. Remarks:
Professor in charge is Dr. Jeffrey Kershner, USDA Forest Service, Fisheries and Wildlife Department, Utah State University, Logan, Utah 84322-5210, (801) 797-2500.
Course Coordinator: Shelly Witt, 801-752-1311, or S.WITT:S22L06A.

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
2 J6,7

IX. Prerequisites:
Be a program manager; you get more out of the course if you have at least 3-5 years experience and/or have taken either Fish Habitat Management or Wildlife Habitat and Plant Management.

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Hydrology for Managers
Course Number: FS-2520-26
Course Location: Varies yearly
Course Tuition: $190

II. Duration of Course:
1 week

III. Program Office:
Kae & Dave Rosgen/Wildland Hydrology Consults
1 Steven's Lake Road
Pagosa Springs, CO 81147 (303-731-4424)

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

V. Brief Description of Course:
This is a special course designed specifically for line officers with responsibility for managing watersheds within the Ecosystem Management framework. National developments in Clean Water Act Reauthorization and USDA/Forest Service leadership together have set the stage for a renewed emphasis in managing for healthy watersheds and watershed outputs.

VI. Target Group:
Line Officers with responsibility for managing watersheds.

VII. Remarks:
Course conducted on request -- Let your Regional hydrologist know you are interested in having this course taught.

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
1 T5

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED:4/94

I. **Course Title:** Natural Resource Policy, Values, and Economics
Course Number: FS-2600-02
Course Location: Yale University
Course Tuition: $2250 (includes lodging and meals)

II. **Duration of Course:**
Two (2) weeks

III. **Program Office:**
Continuing Education Program
Wildlife, Fisheries, and Rare Plants Staff
Logan, Utah 84322-5210

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. List and describe the complex factors involved in policy making.
B. Describe the role of economics in management of natural resources.
C. Describe the human values systems that underlie policy making and economics.
D. Implement decision making skills.
E. Understand what changes are within and beyond an individuals control.

V. **Brief Description of Course:**
This will develop and strengthen the skill and knowledge of the participants on all the complex factors involved in national and regional policy making.

VI. **Target Group:**
This course was created for natural resource professionals.

VII. **Remarks:**
The Professor in charge is Dr. Robert Mendelsohn, School of Forestry & Environmental Studies, Yale University, 205 Prospect Street, New Haven, CT 06511, (203) 432-5128
Course Coordinator: Shelly Witt, 801-752-1311, or S.WITT:S22L06A.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
2 J6,7

IX. **Prerequisites:**
None

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: Expert Witness Seminar
Course Number: FS-2500-03/FWS #IF300
Course Location: Upon request
Course Tuition: Cost-reimbursable basis

II. Duration of Course:
2 day (16 hours)

III. Program Office:
US National Biological Survey
National Ecology Research Center Courses
Fort Collins, CO

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Work effectively with lawyers.
B. Clarify the concepts of the theory of the case, discovery, deposition, trial preparation, and direct- and cross-examination.

V. Brief Description of Course:

This 16 hour course describes how to effectively work with lawyers. Led by an attorney with extensive experience with expert consultants, this course clarifies the concepts to the theory of the case, discovery, deposition, trial preparation, and direct- and cross-examination.

VI. Target Group:

Intended for people with limited trial experience, this course provides a road map of the legal process and offers suggestions for making the expert's participation both effective and less threatening.

VII. Remarks:

Coordinator: US NBS, National Ecology Research Center Courses, Office of Conference Services, Colorado State University, Fort Collins, CO 80523; 303-491-7767

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
1 J6

IX. Prerequisites:
None

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED:4/94

I. **Course Title:** Water Rights
Course Number: /BLM 7000-15
Course Location: Phoenix, AZ
Course Tuition:

II. **Duration of Course:**
5 days

III. **Program Office:**
Bureau of Land Management
WO-220 TC-200

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to manage water resources to ensure water availability for public land uses by:**

A. Recognizing the value and relationships of water to other resources.
B. Understanding and applying appropriate Federal and State laws, regulations, and policies.
C. Collecting, analyzing, and managing water use information.
D. Applying a wide variety of strategies to acquire water rights or otherwise ensure water availability.

V. **Brief Description of Course:**

Will provide participants with the knowledge and skills to address water rights issues and to secure the availability of water for resource management purposes, while reflecting consideration for other local and regional water needs. Will provide information on current water law and policy; water values (beneficial use); water resource planning; strategies/options; intergovernmental relations; water sources and uses (inventory, filings, use assessments, and information management); adjudicative process (administrative and litigative).

VI. **Target Group:** Field resource specialists (new and experienced) in wildlife, recreation, realty, and other programs, whose activities may involve water use/acquisition for water dependent resources or whose activities are dependent upon water resources acquisition.

VII. **Remarks:** This training intends to lay the ground work for activites and direction aimed at greater internal understanding and consistency in addressing water availability issues. Water rights specialists and data managers whose primary or collateral duties are water rights, managers who have program accountability for activities that affect or are affected by water resources, and planners are also encouraged to attend.

Coordinator: Russ Krapf, BLM-Phoenix Training Center, 5050 North 19th Avenue, Suite 300, Phoenix, AZ, 85015; 602-336-6500; FAX: 602-336-6555.

VIII. **Keywords:** **Degree of Difficulty (1,2,3)** **K&S**
1 T1,2; 05; J6

IX. **Prerequisites:**

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED:4/94

I. Course Title: Policy and Legal Aspects of Endangered Species Management
Course Number: FS-2670-01
Course Location: Portland, Oregon
Course Tuition: $850 (does NOT include lodging and meals)

II. Duration of Course:
One (1) week

III. Program Office:
Continuing Education Program
Wildlife, Fisheries, and Rare Plants Staff
Logan, Utah 84322-5210

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. List and describe the legal requirements and processes for managing TES species.
B. Describe the politics, economics and public attitudes toward TES.
C. Describe methods for promoting public involvment in decisions.
D. Develop appropriate administrative records.
E. Describe the essential requirements for coordination and interaction with other Federal and State agencies as well as the lawyers.

V. Brief Description of Course:

This course is designed to increase participants understanding of policy and legal aspects of managing threatened, endangered, and sensitive species. Will focus on the law, policy context, and administrative practices. Classroom lectures, round table discussions, and field visits will allow participants to learn from each other as well as leading experts. Will use a live case study in the Pacific Northwest to explore the practical application of ideas offered in the classroom. Various landscape situations are examined (e.g., forested, range, wetland, aquatic.)

VI. Target Group:

Journey level fish and wildlife biologists, botanists, silviculturists, timber management officers, and other resource managers at Forest Supervisors and District offices.

VII. Remarks:

The professor in charge is Dr. Craig Shinn, Public Administration and Political Science, Lewis & Clark College, 0615 SW Palatine Hill Road, Portland, OR 97219-7899; 503-768-7750

VIII. Keywords: Degree of Difficulty (1,2,3) K&S
1 05; J6

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED: 4/94

I. Course Title: 1900-01 National Forest Plan Implementation Training
Course Number: FS /
Course Location: Sponsored Regionally
Course Tuition: Varies -- generally $100

II. Duration of Course:
4.5 days

III. Program Office:
USDA Forest Service
Planning Staffs - Regionally sponsored

IV. Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:

A. Use the Forest plan to generate possible management practices.
B. Develop a proposed action.
C. Perform the environmental analysis.
D. Document that analysis.
E. Write a decision document.

V. Brief Description of Course:

Course content is broken into 14 units. Each unit has a different emphasis, but each unit builds upon the previous unit. These units take the student through each phase of conducting environmental analysis and implementing the Forest plan. The function of the line officer, ID team leader, and ID team members are discussed in each unit. An overview of each unit is available from the Region Planning Staff. Subject material is taught primarily by students working through example problems as individuals, small groups, and ID teams. These exercises comprise about 40 percent of the class time. Information is presented to the students through use of anecdotes, analogies, and real examples where possible. EAch student will have a notebook containing all the references needed to do the tasks back on the job. Visuals (overheads, flip charts, and handouts) are heavily relied upon to communicate information.

VI. Target Group:

Designed for people that participate on interdisciplinary (ID) teams that conduct environmental analyses. A general understanding of the NEPA process is necessary, and natural resource management experience is helpful in understanding and doing the practical exercises. Functional ID teams are well suited for this course.

VII. Remarks:

Course Coordinator: Forest Service Regional Offices, Land Management Planning

VIII. Keywords:	Degree of Difficulty (1,2,3)	K&S
	2	05

IX. Prerequisites:

WATERSHED TRAINING OPPORTUNITIES NOTEBOOK
USDI BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

DATE LAST REVISED:4/94

I. **Course Title:** 1900-02 Forest Plan Implementation for Managers
Course Number: FS /
Course Location: Regionally sponsored
Course Tuition: $100

II. **Duration of Course:**
3 days

III. **Program Office:**
USDA Forest Service
Planning Staff - Regionally sponsored

IV. **Performance Objectives (the measurable performance expected from trainees upon completion of training). As a result of attending this class and field exercises, the trainees will be able to:**

A. Successfully lead and manage the process of conducting and documenting the Forest Plan implementation analysis which results in decisions that implement Forest plans.

B. Use NFMA and NEPA to achieve objective A.

V. **Brief Description of Course:**

Course taught in 8 units - each unit has a different emphasis, but build upon each other. Emphasis of course is on management and oversight. Exercises throughout the course help participants relate to the topic being presented. Time is provided for participants to relate their own experience to a topic. Units cover: Introduction, Legal principles and environmental law; Plan to practices; Project, proposed action/purpose & need/scoping; Alternatives/effects; Decision making; Litigation and legal considerations; Summary.

VI. **Target Group:**

NEPA managers and line officers.

VII. **Remarks:**

USDA Forest Service Regionally sponsored - Land Management Planning staffs.

VIII. **Keywords:**

Degree of Difficulty (1,2,3)	K&S
2	05

IX. **Prerequisites:**

BLM EMPLOYEE DEVELOPMENT POLICY

It is the policy of the Bureau of Land Management to:

> Enhance the Bureau's ability to accomplish its mission by providing high-quality and innovative training for the development of its human resources.

FS EMPLOYEE DEVELOPMENT POLICY

It is the policy of the Forest Service to:

> Invest in the development of all employees as a high priority to maintain a competent work force to carry out the leadership, managerial, and technical aspects of the Forest Service mission now and in the future.
>
> Provide training that will address the changing nature of the work place and work force, and provide skills and knowledge required to be competent, effective, and productive.
>
> Assure that it is the joint responsibility of each employee and their supervisor to prepare employees to assume greater responsibility for their position and to broaden their experience for future positions.
>
> Assure that each employee has an individual development plan.
>
> Assure appropriate training and development opportunities are made available to all employees at each stage of their career. Employees will receive career counseling to assist in planning their career goals.
>
> (Investment in People, 1993 -- Flyer, USDA Forest Service)

GLOSSARY *

Ability: The aggregate of components -- skills, judgment, readiness, etc., -- required to successfully complete a task.

Competency: The knowledge and skills, usually grouped by content category, that enable people to do natural resource management work.

Knowledge: The act, fact, or state of having a clear perception or understanding.

Skill: Great ability or proficiency; expertness that comes from training practice, etc.

Expert Level: Knowledge, skills, and abilities (KSA) to fully and independently identify and analyze opportunities and needs in complex and routine situations. Develops interdisciplinary solutions with appropriate specialists. Individual may train other professionals and technicians on Forests or Districts in the principles, terminology, and field practice of the subject.

Working Level: KSA to evaluate components and field indicators of projects and programs. Independently identifies and analyzes opportunities and needs in most situations and develops interdisciplinary solutions with appropriate specialists.

Recognition Level: KSA to recognize components of programs and field indicators of projects. Can identify opportunities and needs, and refers these to appropriate specialists.

Orientation Level: Exposure to components and field indicators of programs or projects with no responsibility to evaluate needs and opportunities.

* Glossary adapted from "OPM Key Definitions." Terms were edited to refer to all disciplines. No other changes were made.

FOREST SERVICE

AUTOMAILER USER INSTRUCTIONS

Requesting Documents Using Automailer Access:

Using the short message option, send a message to TRN:W01D (ICS name:ICS Host ID) - the DG address for the Training ICS mailer. In the subject line enter the course number (document's name). Enter nothing else on this line. The course number MUST MATCH EXACTLY - including spaces, commas, periods, dashes, etc. Upper and lower case do not have to match however. No other information is required. The abstracts give the course number - only use the Forest Service course number on the Forest Service DG system. The Forest Service course number is separated from other agency course numbers by a back slash (/). Forest Service course numbers should resemble FS-2500-13.

The requested document will be mailed to the user's mailbox where it can be viewed or printed. Each document desired will require a separate short message. If the requested document can not be found, a message indicating this will be mailed to the user.

Step-by-step Instructions

To request a document from the TRN drawer:

1. Send a short message to TRN:W01D.
2. On the subject line, enter the course number.
3. Press the EXECUTE key.

Example

To: TRN:W01D

Subject: FS-2500-13

Example

To: TRN:W01D

Subject: TRN Help

Comment: !HELP

This example requests a document named "TRN Help" located in a folder called "!HELP". The requested document will be mailed to your inbox. If you make a mistake which causes the mailer to be unable to find your document, you'll receive a message to let you know. Just try again!

NOTE - If you need a listing of available TRN documents, you can get one mailed to you by sending the following short message.

To: TRN:WO1D

Subject: TRN Index

Comment: !INDEX

The Index of TRN documents will be mailed to your inbox.

Requesting subject abstracts/announcements:

If you want to view all the abstracts in the Watershed & Air folder then you must do the following:

1. Press your INTERRUPT function key.
2. Select User Applications.
3. Key in INFO_CENTER and press new line.
4. Press New Line to enter default choice of 1. Standard.
5. Press New Line.
6. Select TRN but if it is not a choice then select other and key in TRN.

This will get you into TRN:WO1D. You then look through the files as if it is you own. Or you can mail the whole folder for Watershed & Air back to your home office from TRN:WO1D if you so desire. This method is much faster.

THE BLM TRAINING CENTER
AUTOMATED CATALOG

All Training Center courses are now listed in the Training Center Automated catalog. The Catalog is a menu-driven system accessible from any personal computer equipped with a modem or telecommunication capability. Any information about a course can then be read while on line or downloaded for later reference.
The Automated Catalog is designed for use by all Bureau employees. With immediate update capability, you will always have accurate information about bureau training.

How Does it Work?

The operation is simple. Using your PC, you call into the catalog. You are asked for your first and last name. Then you are asked to provide a password. After a few questions you are off and running. The Main menu allows you to change your settings, read helpful information about the catalog and to change to the Catalog Menu. The Catalog menu allows you view descriptions of courses or videos and check course schedules. You can even search for a course by key words. It's all automated. Once you have determined which courses you would like to attend, just follow the normal course nomination channels through your supervisor and state training officer.

Quick Start

1. Start your telecommunication software.

2. Dial the Automated Catalog number (602)336 - 6626

3. Enter your First name, Last name and password.

4. You may read any of the information bulletins or go directly to the Catalogs.

Setup

The Automated Catalog operates like many bulletin board systems. There are only a few requirements of the system.

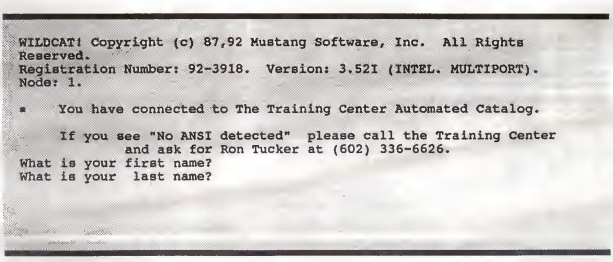
The telecommunications protocol should be set to

Baud rate = 1200 or 2400
Parity = None
Data Bits = 8
Stop Bits = 1

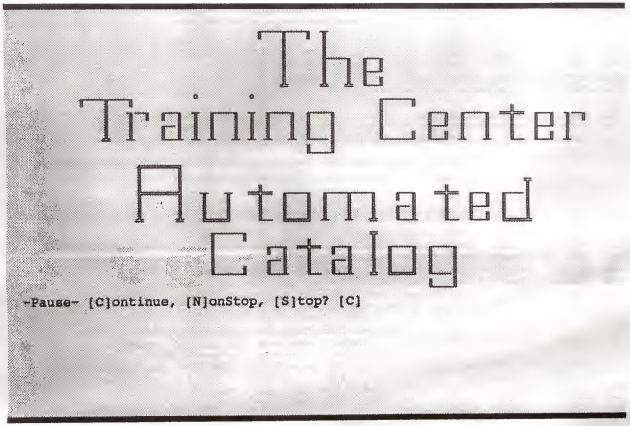
This setting is very similar to that used to access electronic mail. If your software allows you to select terminal emulation type, choose ANSI-BBS if available. If your software does not support a BBS emulation, you may need to install ANSI.SYS in your Config.sys file to allow the ANSI graphical characters to be viewed.
Your IRM support staff should be able to assist you in the configuration of the software and may offer support in using available communication networks. If you are having difficulties, please call the Training Center.

Login

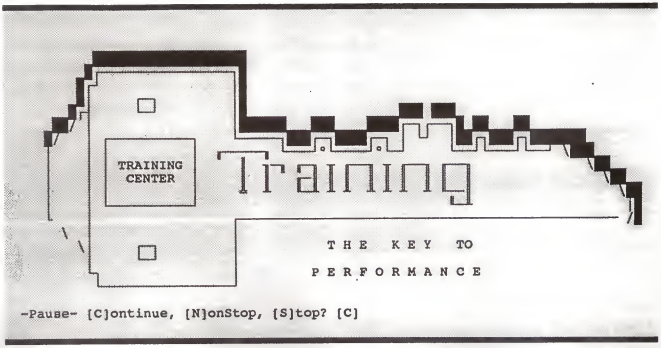
The first step is to dial into the catalog. This is a simple procedure in which your computer makes a phone call to (602)336-6626. After about 60 seconds the following message will be displayed.


WILDCAT! Copyright (c) 87,92 Mustang Software, Inc. All Rights Reserved.
Registration Number: 92-3918. Version: 3.52I (INTEL. MULTIPORT).
Node: 1.
You have connected to The Training Center Automated Catalog.
If you see "No ANSI detected" please call the Training Center and ask for Ron Tucker at (602) 336-6626.
What is your first name?
What is your last name?

Enter your first and last name, pressing Enter after each entry. If you are a new user you will be asked to select a password. Type in a password of your choice and press enter. You will then be asked to verify it. Please select a password that you can remember. You will need it each time you log into the system. At this time new users will be asked to respond to several questions. This information is to allow us to monitor the usage of the system and to contact you if there are system upgrades or changes. If you are not a new user, and your password is accepted, you will be allowed into the system and the following screen is displayed.



Press enter to Continue



Press Enter to continue. The next screen will display news and information bulletins. These include an overview of the system as well as the procedure for nominations.

Help, News and Information

[1] - How to use this Automated Catalog
[2] - Training Center News
[3] - Travel to the Training Center
[4] - Tuition and course attendance
[5] - Nomination Information and Policy
[6] - List of State Training Officers
[7] - Training Needs Assessment Process
[8] - Index of Courses Offered by the Training Center

Bulletins updated: NONE
-Pause- [C]ontinue, [N]onStop, [S]top? [C]

You may select any of these items to read or press enter to continue.

The Quote of the day.

Each time you log into the system you will be greeted with a quote for the day. In some instances you may be sent a message from the system operator. If that occurs you will have personal mail.

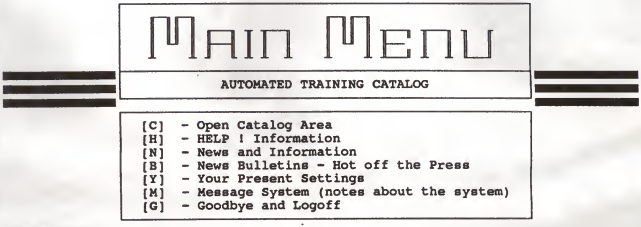
```
Bill, your quote for today is:

"A closed mouth gathers no feet."
        American proverb

No new personal mail found.

Press [ENTER] to continue?
```

Pressing Enter will display the Main Menu. This menu will allow you to change your settings, read messages, and most importantly, access the Catalog Areas. To access any of these options, press the letter associated with each selection.

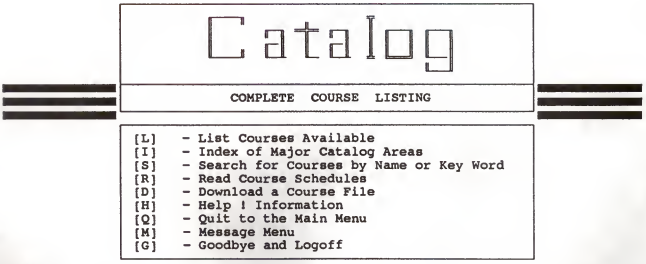

Main Menu
AUTOMATED TRAINING CATALOG
[C] - Open Catalog Area
[H] - HELP ! Information
[N] - News and Information
[B] - News Bulletins - Hot off the Press
[Y] - Your Present Settings
[M] - Message System (notes about the system)
[G] - Goodbye and Logoff
Command >>?

Note* Changing your present settings will come in handy if you do not like the display of course information. Changing to single line display is preferred by most users.

The most commonly used portion of this menu is the Open Catalog area. This selection allows access to the different catalog areas and allows you to search for and read individual course guide pages.

The Catalog Menu

This area contains all course/video information. Displayed below is the Catalog menu and a brief description of each selection.


Catalog
COMPLETE COURSE LISTING
[L] - List Courses Available
[I] - Index of Major Catalog Areas
[S] - Search for Courses by Name or Key Word
[R] - Read Course Schedules
[D] - Download a Course File
[H] - Help ! Information
[Q] - Quit to the Main Menu
[M] - Message Menu
[G] - Goodbye and Logoff
Command >>?

List Courses Available

This selection will allow the display of all courses or only the display of courses within a specific topic area. For instance, if you select L to list all courses, after pressing Enter the following selection is offered.

```
[L]ist Topic Areas, [1-28] Select Topic Areas, [H]elp, [Q]uit, [ENTER = All]?
```

Pressing Enter (=All) will display all of the courses found in that catalog. Pressing **L** will list all of the topic areas in that particular catalog. If the Topic area containing Wildlife courses were selected, only those courses pertaining to wildlife would be listed. There are 28 topic areas found in the catalog.

```
Topic areas available:
   1) LANDS                              2) RANGE
   3) WILDLIFE                           4) SOIL,WATER & AIR
   5) CULTURAL                           6) RECREATION
   7) VISUAL RESOURCE MGT.               8) WILDERNESS
   9) MINERALS ADJUDICATION             10) FLUID MINERALS
  11) SOLID LEASABLE                    12) LOCATABLE & SALEABLE MINERALS
  13) MINERAL RESOURCE EVALUATION       14) GENERAL MINERAL COURSES
  15) VOLUNTEER                         16) SAFETY
  17) GENERAL ADMINISTRATION            18) AUTOMATION
  19) MANAGEMENT & SUPERVISION          20) HUMAN RESOURCES/EEO
  21) PLANNING                          22) HAZARDOUS MATERIALS
  23) BUDGET                            24) LAW ENFORCEMENT
  25) ENGINEERING & CADASTRAL           26) PURCHASING
```

```
27) PROPERTY MANAGEMENT                    28) INTERDISCIPLINARY
```

Selecting number **1** for LANDS will display the following:

```
Scanning Topic area - LANDS
[ 1] 200003.TXT      3,727   08/20/92 | Advanced Lands Resource Management
     Dwnlds: 0     DL Time   00:00:00 |

[ 2] 200006.TXT      2,553   08/20/92 | Pipeline System Short Course
     Dwnlds: 0     DL Time   00:00:00 |

[ 3] 200008.TXT      2,674   08/20/92 | Lands Adjudicative Decisions
     Dwnlds: 1     DL Time   00:00:00 |

[ 4] 200009.TXT      2,401   08/20/92 | Electric Systems Short Course
     Dwnlds: 0     DL Time   00:00:00 |

[ 5] 200011.TXT      3,695   08/20/92 | Managing Major Rights-of-Way Projects
     Dwnlds: 1     DL Time   00:00:00 |

[ 6] 200012.TXT      2,295   08/20/92 | Preparation of Conveyance Documents
     Dwnlds: 1     DL Time   00:00:00 |

[ 7] 200013.TXT      2,923   08/20/92 | Lands and Realty Leadership for the
     Dwnlds: 0     DL Time   00:00:00 | 90's

-Pause- [C]ont, [H]elp, [D]wnld, [I]nfo, [V]iew Course/Video, [S]top? [C]
```

Notice the menu at the bottom of the screen. Pressing C will display the next page of courses. Pressing V will allow you to View or read a course information page. You will be asked to provide the file number and to press enter. The page will then be displayed. To print the course information page, see the section concerning downloading files.

```
-Pause- [C]ont, [H]elp, [D]wnld, [I]nfo, [V]iew Course/Video, [S]top? [V]

Enter the File number to View? [7 ]

Course Number:  2000-13                                  Type of Course:
                                                  Issued/Revised:  FY91
Title:  Lands and Realty Leadership for the 90's

Duration of Course:  3-1/2 Days                  Program Office:  WO-320
Class Limit:                  Course Coordinator:  MarLynn Spears, TC-200

Performance Objectives:
   a.  Demonstrate an understanding of how to achieve acquisition
       objectives through knowledge and innovation, program management,
       and budget.
   b.  Establish a professional credibility with proponents, local
       officials, and Congressional delegations, etc.
```

Index of Major Catalog Areas

The catalog is divided into several subsets to allow easy access by major category. By selecting **I** for Index of Major Catalog Areas from the Catalog Menu, then **L** to List the Catalog areas, the following information will be presented.

```
[L]ist Catalog Areas, [0-6] to change to Catalog Area, [H]elp? [L  ]
Catalog Areas available:

  0) COMPLETE  COURSE  LISTING     1) * LANDS & RENEWABLE RES.*
  2) *  MINERALS MANAGEMENT  *     3) *      MANAGEMENT       *
  4) *        SUPPORT        *     5) *         VIDEO         *
  6) *     STATE COURSES     *
[L]ist Catalog Areas, [0-6] to change to Catalog Area, [H]elp? [   ]
```

Selecting number **2** will change from the Complete Course catalog, to the catalog containing only Minerals Management courses. This catalog will remain in effect until you change to another catalog area.

Search for Courses by Name or Key Word

The Search selection allows you to search for a course using several options. When the Search option is selected the following menu is displayed.

```
Command >>? S
Search criteria:

[N]ame of file  : *.*
[K]eyword       : <ALL>
[D]escription   : <ALL>
[U]ploaded by   : <ALL>

[L]isting method: Double line

Search command [N K D L U], [H]elp, [Q]uit search, [S]tart search? [S]
```

The most common way to search for a course is by keyword and description. The following example of using the search command it to locate any courses that have the word "pest" as keywords.(ie. pesticide courses).

```
Search command [N K D L U], [H]elp, [Q]uit search, [S]tart search? [K]
Keyword? [pest      ]
Search criteria:

[N]ame of file  : *.*
[K]eyword       : PEST
[D]escription   : <ALL>
[U]ploaded by   : <ALL>

[L]isting method: Double line

Search command [N K D L U], [H]elp, [Q]uit search, [S]tart search? [S]
```

```
[L]ist Topic Areas, [1-28] Select Topic Areas, [H]elp, [Q]uit, [ENTER = All]?

[ 1] 900001.TXT       1,894    09/01/92 ¦ Pesticide Applicator Licensing and
   Dwnlds: 1      DL Time    00:00:00 ¦ Certification Program

[ 2] PV900002.TXT     1,991    09/01/92 ¦ Noxious Weed Management Short Course
   Dwnlds: 1      DL Time    00:00:00 ¦

    End of search.
    -Pause- [C]ont, [H]elp, [D]wnld, [I]nfo, [V]iew Course/Video, [S]top? [C]
```

The search using the Description option works in a similar manner. Notice that both Keyword and Description conditions many be used in an individual search process. Enter S to start the search.

Read Course Schedules

To selection Read Course Schedules will allow you to read the schedule of courses provided at PTC. There are 2 options. The schedule may be read by date or by course number. Selecting R from the Catalog menu will display the following:

```
Command >>? R

Enter [1] Course by Date [2] Courses by Number [Enter]=Quit? [ 1 ]
                                                              06-02-93

Start/End Date    Type/Course #  Course Name
*****************************************************************************
10-05 10-09-92        1400-10    FACILITATOR SKILLS WORKSHOP

10-05 10-06-92        1400-10    FACILITATOR SKILLS WORKSHOP-CO

10-07 10-08-92        1400-10    FACILITATOR SKILLS WORKSHOP-CO

10-19 10-23-92        1400-08    TRAIN-THE-TRAINER/ADMINISTRAT. SERVICES

10-19 10-21-92        1703-12A   HAZ MAT MANAGEMENT FOR MANAGERS

10-19 10-23-92        1400-04    PHOENIX INSTRUCTION SEMINAR

10-19 10-23-92        0000-183   1730-03 RE-DESIGN GROUP

10-26 10-30-92        2000-14    WITH/WITHDRAWAL REVIEW SHORT COURSE

10-26 11-06-92        3000-17A   FLUIDS I&E - DRILLING

-Pause- [C]ontinue, [N]onStop, [S]top? [C]
```

Selecting option 2 will display courses by number.

```
Command >>? R

Enter [1] Course by Date [2] Courses by Number [Enter]=Quit? [ 2     ]

                                                                    06-02-93

Course #    Course Name                                  Start/End Date  Location.
=============================================================================
0000-183    1730-03 RE-DESIGN GROUP                      10-19-92 10-23-92 PTC

0000-184    1703-5 REDESIGN GROUP                        10-26-92 10-30-92 PTC

0000-185    1703-2 DESIGN GROUP                          11-02-92 11-06-92 PTC

0000-186    VOL. COORD WORKSHOP/PROG TRACK. SYS TRNG     11-30-92 12-04-92 PTC

0000-187    ENGINEERING TRNG. DESIGN GP.                 11-16-92 11-20-92 PTC

0000-188    8300-01 WORKSHOP                             03-08-93 03-11-93 PTC

0000-189    3000-58 DESIGN MEETING                       03-17-93 03-19-93 PTC

0000-190    1600-02 WORKSHOP                             05-10-93 05-14-93 PTC

1100-01     VOLUNTEER PROGRAM MANAGEMENT                 01-12-93 01-15-93 PTC

-Pause- [C]ontinue, [N]onStop, [S]top? [C]
```

Downloading

There may be an occasion where you may wish to print a copy of the course information page. There are several ways this can be done, one of which is using the screen capture features of your telecommunications software or by downloading the file. Before you begin you should determine the type of download protocol supported by your software. A most common used protocol is XModem. This protocol has a transfer rate of approximately 200 characters per second. If you choose an ASCII Character protocol, the transfer rate is 1 character per second. Use Xmodem where possible.
Once you have determined the types of download protocol supported by your software, the following procedures should allow easy downloading of course information.

1. Locate and determine the course number (in this case a file name).

2. Select the Download option from the menu.

3. You will be prompted for the file /course name. An example might be 173701.TXT. Be sure to enter the extension .TXT

4. Then you will be asked if you wish to logoff when done. That is your

option. If you are finished, type Y for yes.

5. Select the protocol to be used. We suggest Xmodem.

6. The next step is to activate the download sequence on your terminal. For Softerm press Alt-1, then Pagedown. Then use the space bar until Xmodem protocol is shown. For Procomm Plus press Pagedown to begin the download.

7. Under destination, enter the drive and directory where the file should be stored. Then for Softerm press Alt-Enter to begin.

8. The file will be transferred in an ASCII or TEXT file format. Most wordprocessors will accept this format. The file may be retrieved normally into a WordPerfect document and printed. (Note: there may be a few characters such as @ symbols which need to be deleted.)

Trouble shooting

Question: The Catalog will answer and allow me to enter my first name but seems to lock up when I enter my last name?

Possible Solution: Your terminal is set to 7-1-E. Check your settings and if you are running over a wide area network, make sure that the WAN is not changing your setting to something else other than 8-1-N.

Question: My computer dials in but it never seems to answer, what gives.

Possible Solution: There are times when the Catalog may need to be reset. PLEASE call the Training Center when this occurs. You might also dial the number with a regular phone to listen for the catalog to answer. This will help us to diagnose the problem.

Uploading files

This portion of the instructions is intended for those individuals who have uploading access privileges to the system. This includes all state training officers and training personnel for Arizona.

Step 1. The first step is to create the file to be uploaded. A WordPerfect macro has been created and can be used to help create files. This macro is found in a file named ALTN. This is copied to the WP directory and is launched from WordPerfect by typing Alt-N.

Any file format can be used, the main concern is that the file be stored in an ASCII or DOS Text format. The file name should also include the extension of .TXT. For instance PDO7-22.txt would be a file from the Phoenix district on July 22 and is a text file.

Once you have created and saved the file, you can check to be sure that the file is in an DOS Text format by typing **TYPE filename.txt** from the DOS prompt.

Step 2. Next Login to the Catalog. Go to the Catalog Menu and select I to see the index of Catalog areas. The catalog area 7 Arizona Nominations has been set aside for Arizona use. Select area 7. The Catalog Menu should indicate that the current catalog is Arizona Nominations.

Step 3. List the files in the **Arizona Nominations** area by typing L to list. Do this to make sure that a file does not already exist with the name you are going to use.

Step 4. Then select Upload (**U**) from the Catalog Menu.

Step 5. Select the **XModem** file transfer protocol.

Step 6. Enter the name for the file. This is the file name that will appear in the catalog. Be sure to include the **.TXT** extension.

Step 7. Answer **NO** to the question "Do you wish to protect this file?".

Step 8. The next prompt is Description. Type in one line of information that describes the content of the file. (ie. Nominations from Phoenix district on July 22.)

Step 9. Press enter to skip the section on Keywords.

Step 10. Answer NO to the question about Detailed Description.

Step 11. Then press enter to Continue and the question about Abort or Goodbye or Continue.

Step 12. Now to prepare your terminal to send the information. The following instructions are for sending using Softerm. Press **ALT - 1**. This will display the _____ menu. Press the PageUp key for upload.

Step 13. Using the up and down arrows, change the protocol to XMODEM, then press enter.

Step 14. Press enter to skip XMIT, and move to the Source file option. Enter the drive letter, the file path, and the file name, then press enter.
(ie. C:\ron\1730-11.txt)

Step 15. Now to begin the upload press **ALT-ENTER**. When the file transfer is complete, your machine should beep a few times and respond that the file transfer is completed. Now press **ALT-ESC**, to exit from the Softerm upload menu.

Step 16. At this point the file that was sent should be displayed in the Listing of files. Select the L to List the courses (same as a file) from the Catalog Menu. The file that was sent should be shown in the listing and may be viewed by selecting View at the prompt. If the information in the file is garbled, then the file was not in a DOS Text format. (Usual mistake will be to save the file in the WordPerfect format.)

ACCESSING U.S. GEOLOGICAL SURVEY TRAINING COURSES

Several courses offered by the Water Resources Division (WRD) of the U.S. Geological Survey are listed and described in this notebook. The following information explains the nomination process for non-WRD employees interested in attending these courses:

> "The non-Water Resources Division candidate must complete an application to attend training and forward it with a cover letter to the appropriate WRD office in their area (District, Region, or Headquarters) requesting certification and nomination approval. Approval of the nomination of cooperators, other federal agency, foreign, other USGS Division, or contractor personnel is at the discretion of the Regional or Headquarters office. Consequently, there are no designated number of slots set aside for the training of non-WRD candidates."

An application is located in the appendix of this notebook. Alternatively, an application can be obtained from the local office of the Water Resources Division (USGS). In general, cooperating agencies can expect to pay $100 tuition per person per day, and a hydrologist interested in attending one of the USGS courses should contact the local WRD office for additional information.

USGS Training Application

DATE _____

MEMORANDUM

TO: Regional Hydrologist, _____ Region or
Assistant Chief, Hydrologist, PC&TS

FROM: _____

SUBJECT: TRAINING--Application to Attend Training Course

COURSE NAME _____

COURSE NUMBER _____ DATE OFFERED _____

APPLICANT'S NAME _____

TITLE AND GRADE _____

PRESENT DUTY STATION _____

DESCRIBE APPLICANT'S NEED FOR TRAINING (IMMEDIATE, LONG TERM) _____

_____

APPLICANT HAS SATISFIED THE REQUIREMENTS FOR ELIGIBILITY AS INDICATED BELOW:

PREREQUISITE TRAINING COURSE	YEAR COURSE WAS TAKEN	EQUIVALENT EXPERIENCE OR * KNOWLEDGE OBTAINED
	_____	_____
_____	_____	_____
_____	_____	_____

*ENTER YEAR(S) AND DESCRIBE KNOWLEDGE OR EXPERIENCE: (USE REVERSE SIDE IF NEEDED)

_____

_____

APPLICANT WOULD DRIVE AS CARPOOL DRIVER _____ yes _____ no

FFS#_____ Account #_____

CERTIFICATION

APPLICANT _____

DISTRICT OR STATE OFFICE CHIEF,
DISTRICT OR STATE OFFICE TRAINING OFFICER,
OR SUPERVISOR _____

(Revised 9/21/90)

PERSONAL TRAINING LOG

Keep a record of the courses you have taken so that at a glance you can plan what else you need to reach your goal.

COURSE	YEAR	K&S	COMMENTS

TRAINING NEEDS FOR FUTURE POSITIONS

Keep a record of K&S's for positions you would like to have in the future. Also keep a file of those future positions descriptions. This is a good way to map out your training plan.

POSITION DESCRIPTION K&S

PROGRAM CONTACTS

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Index of Abstracts

Course Title	Topic Section
1900-01 NF Plan Implementation Training	(PL) NEPA/Planning
1900-02 NF Plan Implementation for Managers	(PL) NEPA/Planning
Alluvial Systems	(TD) Surface Water
Applied Biodiversity Conservation	(TD) Aquatic & Riparian Ecosystems
Applied Fluvial Geomorphology	(TD) Surface Water
Aquatic Resource Monitoring	(TD) Aquatic & Riparian Ecosystems
AUTOCAD 12 for SMCRA related applications	(TD) Statistics & Information Mgmt
Basic Hydraulic Principles	(TD) Surface Water
Basin Surveys & Applications	(TD) Watershed Mgmt & Analysis
"	(TD) Aquatic & Riparian Ecosystems
Biogeochemistry of Natural Waters	(TD) Water Quality
Biostatistics	(TD) Statistics & Info Mgmt
Concepts in Aquatic Ecology	(TD) Aquatic & Riparian Ecosystems
Data Import & Export (TIPS oriented)	(TD) Statistics & Information Mgmt
Effective Communications	(PL) Communications
Erosion Prediction Technologies	(TD) Watershed Mgmt & Analysis
Expert Witness Seminar	(PL) Law
Field Water Quality Methods for Grndwtr & Srfc wtr	(TD) Water Quality
Fish Habitat Management	(TD) Aquatic & Riparian Ecosystems
GPS Technology; Mine lands	(TD) Statistics & Information Mgmt
Groundwater and Contaminant Flow	(TD) Groundwater
Groundwater Concepts & Modeling	(TD) Groundwater
Groundwater Field Techniques	(TD) Groundwater
Groundwater Hydrology	(TD) Groundwater
Groundwater Principles	(TD) Groundwater
Groundwater and Surface Water Relationships	(TD) Groundwater
"	(TD) Surface Water
HC-Gram	(TD) Water Quality
HEC 1 (Flood Plain Hydrology)	(TD) Watershed Mgmt & Analysis
"	(TD) Surface Water
HEC 2 (Water Surface Profile Computation)	(TD) Surface Water
HEC 6 (Sediment Transport Calculations)	(TD) Surface Water
"	(TD) Water Quality
HEP - Habitat Evaluation Procedures	(TD) Aquatic & Riparian Ecosystems
HEP and HSI Software, Using	(TD) Aquatic & Riparian Ecosystems
Hydric Soil Morphology, Class & Interp	(TD) Aquatic & Riparian Ecosystems
Hydrogeomorphic Approach to Wetland Assmt	(TD) Aquatic & Riparian Ecosystems
Hydrology for Managers	(TD) Watershed Mgmt & Analysis;
"	(PL) Resource, Policy, Values &
Econ	
IFIM Stream Habitat Sampling Techniques	(TD) Aquatic & Riparian Ecosystems
IFIM Problem Analysis and Negotiating	(TD) Aquatic & Riparian Ecosystems
IFIM Designing and Negotiating Studies	(TD) Aquatic & Riparian Ecosystems
Jurisdictional Delineation of Wetlands	(TD) Aquatic & Riparian Ecosystems
Leadership & Communications	(PL) Communications
Managing Forest Ecosystems	(TD) Watershed Mgmt & Analysis
Modeling Groundwater Flow & Contaminant Transport	(TD) Groundwater
Modern Analytical Photogrammetry	(TD) Watershed Mgmt & Analysis
MODFOW Numerical Groundwater Modeling	(TD) Ground Water
Natural Resource Policy, Values & Economics	(PL) Nat Res Pol, Val & Econ
Nonpoint Source Pollution Control	(PL) Program Mgmt
PHABSIM, Using	(TD) Aquatic & Riparian Ecosystems
Photogrammetry & Aerial Photo Interp	(TD) Watershed Mgmt & Analysis
Policy & Legal Aspects of Endangered Species Mgmt	(PL) Law
Probability & Statistics for Data	(TD) Statistics & Information Mgmt

Index of Abstracts

Course Title	Topic Section
(TD) = Technical Development	(PL) = Program Leadership
Program Management	(PL) Program Mgmt
Reflex: The Analyst	(TD) Statistics & Information Mgmt
Riparian-Wetland Ecological Site Class	(TD) Aquatic & Riparian Ecosystems
SB-Slope Slope Stability Analysis	(TD) Watershed Mgmt & Analysis
SDPS Surface Deformation Prediction System	(TD) Groundwater
SEDCAD+ and SEDACAD combined	(TD) Watershed Mgmt & Analysis
Sediment Data Collection Techniques	(TD) Water Quality
Sediment Records Computation	(TD) Water Quality
Soil, Water, and Air Mgmt	(PL) Program Mgmt
Statistical Anal for SMCRA related apps	(TD) Statistics & Information Mgmt
Statistical Analysis of Hydrologic & Chemical Data	(TD) Statistics & Information Mgmt
Statistical Approach to Surfacewater Hydro Analysis	(TD) Statistics & Information Mgmt
StratiFact	(TD) Groundwater
Stream Temperature Modeling	(TD) Water Quality
Surface Water Field & Records	(TD) Surface Water
Surface Water Flow Simulation	(TD) Surface Water
"	(TD) Watershed Mgmt & Analysis
Surface Water Principles	(TD) Surface Water
TIPS - GSM (Introduction)	(TD) Statistics & Information Mgmt
"	(TD) Watershed Mgmt & Analysis
Water Quality Monitor Networks - Design	(TD) Water Quality
Water Quality Principles	(TD) Water Quality
Water Rights	(PL) Law
Watershed Rehabilitation I	(TD) Watershed Mgmt & Analysis
Watershed Rehabilitation II	(TD) Watershed Mgmt & Analysis
Watershed Restoration Overview	(TD) Watershed Mgmt & Analysis
Watershed Restoration Techniques	(TD) Watershed Mgmt & Analysis
Watershed Systems Modeling I	(TD) Watershed Mgmt & Analysis
Wetlands\Stormwater Mgmt - Design\Const\Use	(TD) Aquatic & Riparian Ecosystems
Workstation Basics	(TD) Statistics & Information Mgmt

APPENDIX

Development of

HYDROLOGIST: "CORE" KNOWLEDGE and SKILLS GRADES 5 through 12

Forest Service and Bureau of Land Management

1994

Need for this paper was identified by Forest Service Regional hydrologists in April 1992 and was reinforced by an OPM review of hydrologist classification standards, which began in 1992. The paper reports results of a July 1992 meeting of hydrologists Harry Parrott and Jim Maxwell of the Forest Service (Forest Service Regional Hydrologists in R9 and R2) and Jim Fogg of the Bureau of Land Management (Technical Services Center, Denver). During November 1992, Jim Maxwell and Harry Parrott met with Forest Service Washington Office Program Leaders Warren Harper (Hydrology and Water Quality) and Steven Glasser (Water Rights) and made substantive revision of the initial draft based on a field review comments. Watershed and Air Director Bill McCleese was verbally briefed on the November draft. The paper was edited in 1993, based on recommendations received through Forest Service Regional Hydrologists. It was further revised in 1994 for incorporation into the national Forest Service Continueing Education program for hydrologists.

References

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* Association of University Watershed Scientistsm 1977. Qualifying Criteria for Hydrologists.

* Forest Service undated. Standard position descriptions, hydrologist grade 5-11 (position descriptions N4001, N4002, N5067, and N5068 respectively).

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* Forest Service 1988. Report of National Soil, Water and Air Training Task Force ("Grest Report").

* Forest Service 1992. Letters on hydrologist classification standards by USFS hydrologists Keith McLaughlin, John Rector, and Harry Parrott.

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* OPM 1990. TS-231, Hydrology Qualification Standards, GS-5/above.

* OPM 1991. TS-1, Qualifications Standards Handbook, Hydrology Series.

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Ken Roby
Larry Schmidt

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